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JOURNAL OF THE TRANSACTIONS  
OF  
THE VICTORIA INSTITUTE.

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VOL. XXXVII.

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JOURNAL OF

THE TRANSACTIONS

OF

The Victoria Institute,

OR,

Philosophical Society of Great Britain.

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EDITED BY THE SECRETARY.

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VOL. XXXVII.



LONDON :

(Published by the Institute, 8, Adelphi Terrace, Charing Cross, W.C.)

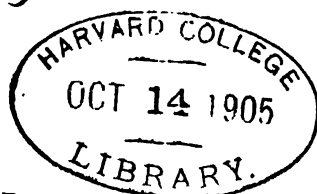
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*\* \* \* The Institute's object being to investigate, it must not be held to endorse  
the various views expressed at its meetings.*

## PREFACE.

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IN issuing the 37th Volume of the Transactions I have only to impress on Members and Associates the obligation they are under to endeavour to increase the influence of the Institute and to add to the number of its adherents. The Council has never adopted outside means of popularity by advertising in order to attract the public, being satisfied with dependence on the efforts of its friends, the interest and importance of its objects, and the honour of enrolment in its ranks. Nevertheless, efforts are necessary to bring the work of the Victoria Institute to the notice of those whom it is desirable to attract, and with this object a copy of the "Objects Paper" will be issued to those receiving the new volume of Transactions, with the hope that each Member or Associate will endeavour to bring in at least one adherent during the ensuing year.

The Council would esteem it a favour to receive communications on subjects suitable for discussion and publication, and also to receive the names of persons considered qualified to deal with them

EDWARD HULL, LL.D.,

*Secretary and Editor.*



## ANNUAL GENERAL MEETING.

HELD IN THE HOUSE OF THE SOCIETY OF ARTS,  
WEDNESDAY, JUNE 7TH, 1905.

THE RIGHT HON. THE EARL OF HALSBURY (PRESIDENT),  
IN THE CHAIR.

Letters of regret for inability to be present were read from Bishop Welldon, Mr. David Howard, V.P., the Dean of Canterbury, the Rev. G. W. Whidborne and others.

The Right Hon. The EARL OF HALSBURY, F.R.S. (President), opened the meeting. He regretted that a public duty would prevent him from remaining—it was not a private duty, but a public duty, and as such could not be neglected—and therefore he must vacate the chair for the present.

The SECRETARY.—In the absence of the Lord Chancellor, I propose that General Halliday be requested to take the Chair.

General HALLIDAY.—In the absence of the Lord Chancellor, I will now call upon the Secretary to read the Report.

The Report of the Council was then read by the Secretary, Professor E. HULL, LL.D., F.R.S., as follows :—

1. In presenting the THIRTY-NINTH ANNUAL REPORT, the Council have pleasure in stating that the past session has not been less satisfactory in its proceedings than those which preceded it. As was to be expected, there are losses in membership by death and resignation; but in the latter cases it is seldom that a member resigns without expression of regret that he is obliged to do so owing to circumstances over which he has no control. Occasionally resignations are withdrawn, and members rejoin the Society.

2. As regards finance it will be seen by the duly audited balance sheet that while we entered the year 1904 with a credit balance of £73 9s. 8d., we entered the year 1905 with a balance of £28 2s. 10d., all bills outstanding having been paid.

3. The number of members and associates has slightly decreased since last year, which is probably to be attributed to the prevalent financial stress. It is much to be desired that our members should endeavour to enlist the interest and adherence of their friends.

The following is a statement of the numbers of the constituency of the Institute at the end of May, 1905:—

Life Members	...	...	...	44	in number.
Annual "	...	...	...	161	"
Life Associates	...	...	...	70	"
Annual Associates	...	...	...	421	"
Hon. Corresponding Members	...	...	...	174	"
Total				870	

4. The following is the new list of the Officers and Council:—

**President.**

The Right Honourable The Earl of Halsbury, M.A., D.C.L., F.R.S. (Lord Chancellor).

**Vice-Presidents.**

Sir T. Powell Buxton, Bart., K.C.M.G.  
 Professor Lionel S. Beale, F.R.C.P., F.R.S.  
 W. H. Hudleston, Esq., F.R.S., F.G.S.  
 Alexander McArthur, Esq., D.L., J.P.  
 David Howard, Esq., D.L., F.C.S.  
 Lord Strathcona and Mount Royal, LL.D., F.G.S.  
 Lieut.-General Sir H. L. Geary, K.C.B.

**Honorary Correspondents.**

The Right Hon. Lord Kelvin, Past P.R.S.	
Professor A. Agassiz, D.C.L., F.R.S.	Professor A. H. Sayce, D.D., LL.D.
Professor E. Naville ( <i>Geneva</i> ).	Professor Fridtjof Nansen, D.Sc.
Professor Maspero ( <i>Paris</i> ).	Professor Warren Upham.

**Honorary Auditors.**

J. Allen, Esq.	General Mackinlay, late R.A.
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**Honorary Treasurer.**

Edward Stanley M. Perowne, Esq.

**Secretary and Editor of the Journal.**

Professor Edward Hull, M.A., LL.D., F.R.S.

## Council.

*(In Order of Election.)*

Rev. Principal James H. Rigg, D.D.	Theo. G. Pinches, Esq., LL.D., M.R.A.S.
Maj. Kingsley O. Foster, J.P., F.R.A.S.	Ven. Archdeacon W. M. Sinclair, M.A., D.D.
D. Howard, Esq., D.L., F.C.S., F.I.C., <i>f.c.</i>	Gerard Smith, Esq., M.R.C.S.
<i>(Trustee).</i>	Commander G. F. Heath, R.N.
Rev. Dr. F. W. Tremlett, D.D., D.C.L., Ph.D.	Rev. Canon Tristram, M.A., D.D., LL.D., F.R.S.
Very Rev. Dean Wace, D.D. <i>(Trustee).</i>	Rev. G. F. Whidborne, M.A., F.G.S., F.R.G.S.
Rev. Chancellor J. J. Lias, M.A.	Lieut.-Gen. Sir H. L. Geary, K.C.B., R.A.
Capt. E. W. Creak, C.R., R.N., F.R.S.	Walter Kidd, Esq., M.D., F.Z.S.
Rev. Canon E. B. Girdlestone, M.A.	Edward Stanley M. Perowne, Esq.
General Halliday.	Martin Luther House, Esq., B.L.
Rev. John Tuckwell, M.R.A.S.	Rev. R. Ashington Bullen, M.A., F.G.S.
Lieut.-Colonel Mackinlay, late R.A.	Colonel T. Holbein Hendley, C.I.E.

## 5. Deaths.

The Council regret to have to record the death during the past year of the following supporters of the Institute:—

Colonel W. M. C. Acton, Major-General H. Aylmer, W. A. Browne, Esq., LL.D., Rev. Henry Brass, M.A., Right Rev. J. W. Bardsley, D.D., Bishop of Carlisle, Sir Mark W. Collet, D.L., F. H. Crozier, Esq., Colonel P. D. Marett, R.A., Captain A. Seton, R.A., The Ven. Archdeacon A. Stock, B.D., Julian Sturgis, Esq., Rev. M. T. Spencer, M.A., Rev. F. A. Walker, D.D., F.L.S., for many years a valued member of the Council, Rev. H. M. Webb-Peploe, M.A., The Right Hon. Lord Wynford, William Miller, Esq., Dr. Thomas Chaplin, member of the Council.

*The Gunning Prize.*—The Council are now able to announce the terms on which the award of the prize, arising from the interest of the sum of £500 left by His Excellency the late Dr. Gunning to the Institute. This prize, of the value of £40, is open for competition to all persons who shall have become members or associates within three months from the present date and whose subscriptions are not in arrear. It is to take the form of an essay, the subject for this year being, "The bearing of recent Oriental Discoveries on Old Testament History." A paper containing information regarding the rules and needful directions for the competition will be sent out immediately. The date for the reception of the competing essays is the 15th October next. The limit of the essay is fixed at about thirty pages of the type and size of the *Journal*.

## 6. MEETINGS.

The subjects dealt with at the ordinary meetings during the past session may be arranged under the following heads:—

## ANNUAL MEETING.

## 1. BIBLICAL.

1. "The Growth of the Kingdom of God." By Rev. J. BRADFORD WHITING, M.A.
2. "The Resurrection of Christ." Address by Rev. Canon GIRDLESTONE, M.A.
3. "Biblical Astronomy." By Lieut.-Colonel GEORGE MACKINLAY.
4. "Minerals and Metals of the Old Testament." By CAVALIERE W. JERVIS, F.G.S.

## 2. PHILOSOPHY.

1. "The Right Way in Psychology." By Rev. F. STORRS TURNER, B.A.
2. "The Influence of Physiological Discovery on Thought." By EDWARD P. FROST, D.L.

## 3. PHYSICAL.

1. "Geological Exterminations." By CHARLES B. WARRING, M.A.
2. "The Nebular and Planetesimal Theories of the Earth's Origin." By WARREN UPHAM, M.A., F.G.S.

## 4. HISTORICAL.

1. "The History of Rajputana." By Colonel T. H. HENDLEY, C.I.E.
2. "Confucianism." By Rev. ARTHUR ELWIN.
3. "The Messiah of Qadian." By Rev. H. G. GRISWOLD, M.A.

7. *The Journal of Transactions.*

The thirty-sixth volume of the *Journal of Transactions* has been circulated in many lands. The Council may be allowed to repeat, for the information of recent members, what has already been stated—that from time to time expressions of approval and gratitude are received from members living abroad, while many of the learned societies at home and abroad exchange publications with the Institute. We have also several public libraries who subscribe for the Volumes. Of persons connected with our Society, about 74 belong to the United States of America, 40 to India, 14 to Australia, 12 to Canada, and about the same number to New Zealand and South Africa, and 1 (Public Library) to Bermuda; and a few others to France, Germany, Italy and Sweden. The Secretary will be glad to receive subjects for papers suitable for reading before the meetings of the Institute, and suggested names of competent writers.

8. *Conclusion.*

While humbly desiring the continued blessing of Almighty God, and the support of its members, the Council wishes to express its thanks to the contributors of papers which are being offered in increasing numbers, and to press upon its friends the duty of doing what in them lies to increase the membership and extend the usefulness of the Institute.

Signed on behalf of the Council,

HALSBURY,  
*President.*



# BALANCE SHEET, year ending December 31st, 1904.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Balance from 1903 ..	21	0	0	Printing ..	..	..	128 6 3
Subscriptions :—1 Life Member ..	6	6	0	Postage ..	..	..	38 19 11
3 Members, 1903..	270	18	0	Binding ..	..	..	47 15 8
129 " 1904 .	6	6	0	Reporting ..	..	..	25 2 0
8 " 1905 .	10	10	0	Stationery ..	..	..	14 2 6
1 Life Associate ..	1	1	0	Expenses of Meetings	..	..	8 14 6
1 Associate, 1898	1	1	0	Clerk—Salary ..	..	..	115 3 8
1 " 1899	1	1	0	" Insurance ..	..	..	2 11 10
1 " 1900	1	1	0	Rent ..	..	..	180 0 0
2 Associates, 1901	2	2	0	Housekeeper ..	..	..	1 1 6
7 " 1902	7	7	0	Coal and Light	..	..	8 10 3
23 " 1903	24	3	2	Library, &c. ..	..	..	19 12 7
305 " 1904	320	5	0	Secretary ..	..	..	200 0 0
16 " 1905	16	16	0	" Travelling	..	..	10 0 0
Subscription paid in error	3	3	0	Insurance (Fire) ..	..	..	0 12 0
Dividend on £1,165 18s. 9d. 2½ p.c. Consols	..	..	691 19 0	Bank Charges ..	..	..	0 4 6
Sale of Books, &c. ..	..	..	27 14 10	Sundries ..	..	..	3 12 6
Donations ..	..	..	34 9 6	Subscription repaid	..	..	3 3 0
	..	..	3 2 6	Balance Credit ..	..	..	28 2 10
			<u>£880 15 6</u>				<u>£880 15 6</u>

There is also the Gunning Trust Fund £508, Great Indian Peninsula 3 p.c. Stock invested in the names of the Trustees (The Dean of Canterbury and D. Howard, Esq.); the interest is to accumulate for periods of three years and it is then to be expended on a prize for an Essay.

We have examined the Balance Sheet with the Books and Vouchers, and find a Credit Balance of £28 2s. 10d.

April 17th, 1906.

JOHN ALLEN,  
G. MACKINLAY, Lieut.-Colonel, } *Auditors.*

Rev. Dr. IRVING, in moving the resolution, "That the Report be received, and the thanks of the Members and Associates be presented to the Council, Officers and Auditors for their efficient conduct of the business of the Institute during the past year," said—I do not know that the report calls for any special remarks, except it be regretted that the number of Members and Associates has not increased this year so much as we could have wished. A year or two ago I was called upon to speak in this room on a similar subject and I expressed the hope that the falling off of clerical members was only temporary; and I would venture to express the hope still that we shall have an increase in the near future, and that the Society will have an increase of clerical members; for my studies, which try to stride the double horse of science and theology, have led me to feel very strongly that it is mainly in the ranks of the clergy that the work of this Society is likely to bear good fruit. Only within the last two or three weeks the readers of the *Guardian* newspaper have probably noticed that my unworthy name has appeared. In one case I had a severe castigation administered to me by a brilliant writer on the theological side, who has made himself to some extent acquainted with science, because of the audacity on my part in venturing to put in a postscript to a letter—an important letter bearing upon New Testament Exegesis—uttering a warning to those who had not been serious students of science against dealing too freely in scientific phraseology, because I hold that the cause of truth is not advanced in that way. The castigation I received at the first moment seemed too funny, but of course the answer was very easy, and I have answered Canon MacColl.

Several years ago I took an opportunity of writing to Dr. Creighton, Bishop of London, a very strong letter on the great importance of the clergy being trained so as to be in sympathy with the forward movement and thought of this twentieth century, and he entirely agreed with me; but declared there was no energy to spare for great intellectual issues for a man in his position.

I venture to say it would be a good thing if all influential members would try and induce more clergy into our ranks. They have the ear of the public in a privileged way, and it is painful to find preachers beginning to talk about science and dealing with scientific things when they are out of their depth.

I move that this report read by the Secretary be received, and the thanks of the Members and Associates be presented to the Council, the Honorary Officers and Auditors for their efficient conduct of the business of the Institute during the year. I need not add more than this, my strong appreciation of the way in which Professor Hull discharges his duties with great enthusiasm.

Mr. WOODFORD PILKINGTON, M.Inst.C.E.—Mr. President, ladies and gentlemen: It affords me great pleasure this afternoon in having been asked to second the adoption of this report. I have attended with very great pleasure the reading of several papers mentioned in this report, and I think that this Institute holds a most distinguished and exceptional place in the Institutes of like character, inasmuch as it takes up morals and ethics, and devotes itself also to that very necessary work that a former speaker has alluded to, the connection between science and religion, showing the absolute truth of what is revealed to us in connection with science in the Bible. I do not know of any other Institute that devotes itself in a like way to that broad subject with so much success as this does. I am certain that this Institute on that account alone has come to stay and increase its members.

It is not within the province of a seconder to take up much time in seconding the proposal, and therefore this afternoon I simply conclude with what I have already stated, and second the adoption of this report and the thanks of the members which are included in the motion.

The resolution having been put from the chair and carried,

Colonel HENDLEY replied.—On behalf of my colleagues I thank you for the kind way in which you have received this resolution. We feel that the work devolves most upon the Secretary, but you can show your gratitude by increasing the number of members, by recommending the Society to your friends.

The CHAIRMAN.—I have great pleasure in asking Professor Silvanus Thompson, D.Sc., F.R.S., to give us the address which he has prepared.

## THE ANNUAL ADDRESS.

### *RECONSTRUCTION AND RESTATEMENT.*

By Dr. SILVANUS P. THOMPSON, F.R.S.

HOWEVER inadequate may be some of the arguments employed by advocates of the school of philosophy styling itself Monism, there is undoubtedly a bottom truth underlying the idea that life is in its widest sense *one*. Nature is not infinitely divorced from art; matter is not separable from form; thought is not indefinitely remote from energy; nor is the gulf between religion and science incapable of being bridged over. Faith and reason are not mutually incompatible, however different may seem at first sight the provinces in which each appears supreme. For neither is the human being constructed with intellectual bulkheads which prevent intercommunication between the faculties, nor is man's nature so delimited off from the nature of other kinds of organic life as to preclude the direct interaction of forces whether physical or psychic. Man is in fact to an extent more largely understood in recent times than of yore, a product of his environment. Religion is a part of that environment, and has had no small share in moulding man to that which morally, socially, and intellectually he is to-day. He has been slowly learning the laws of the physical part of his environment; he is also, but more slowly, learning those of the spiritual part. If of late he has been beginning to understand that the physical part of his environment, the world of things and forces, is not so exclusively dominant as his teachers of thirty years ago would have had him think; and if he has become more willing to admit the existence of moral and spiritual things as a complement to the physical cosmos, he has also had his eyes opened to see that in the world of moral and spiritual forces there is a call for the play of his trained reason. The widening of outlook on the physical side finds its counterpart on the moral and religious side. The development which has brought about the reconstitution of science involves in fact a restatement of religion.

Man cannot remain stationary in a state of arrested development amidst the play of forces by which he is surrounded. Evolution takes its course whether he is conscious of it or not; its operations are not dependent, save to a very secondary degree, upon his will or his consciousness. The child

grows, and his growth is effected by food, climate, air and light, independently of his consciousness or will. The development of his mind and of his moral nature for good or ill is very largely determined by his surroundings. What is true of the individual is true also of the race; and its development physical, intellectual, moral and religious, is, whether acknowledged or not, unquestionably dependent upon environment. It is impossible that it should be otherwise. The very condition of life is changed. Decay and death are processes inseparable in the order of nature from the possibility of life. And this is true also of intellectual and religious life. No advance in thought is possible without involving some change, some abandonment of earlier, less advanced thought. In ethics as in morals, men advance as "on stepping stones from their dead selves." In religious thought no progress is possible, save by the renunciation of some earlier beliefs, once held sacred in the childhood of the race. Not that eternal truth changes, but man's appreciation or perception of it does. Newer revelations supersede old ones, or furnish proof that part of that which, in the childhood of the race, had been taken for revelation was rather revelation misinterpreted by human minds; treasure in earthen vessels; wisdom but half understood, and admixed with human imagination. The problems of one age differ from those of another: the temptations of one age may differ from those of another. It may be easy to mistake, amid different surroundings, the precise import of words uttered to men of a former time; for words themselves change their meanings and connote different ideas to men of different generations. If for no other reason than this, it is needful from time to time that there should be restatements of the things held to be true; for if the statement persists when the meanings of its terms have changed, the statement ceases to be entirely true even though the truth it is supposed to state remains unchanged. All this may be admitted, nay, must be admitted, by the reverent and intelligent seeker after truth. And the greater his reverence for truth, the more freely will he make the admission.

The fact is that here, in the twentieth century, we do not stand precisely in the same position as our fathers stood in the nineteenth, or our forefathers in the centuries before. The steam-engine and the printing-press, the telegraph and the dynamo, the telescope and the microscope, the camera and the spectroscope, have wrought revolutions not only in the material aspect of town and country but in the thoughts of men concerning the material world in which they live. During the last sixty years

or so in particular, men's minds have widened. The outlook in the physical, the biological, and the historical sciences subtends a vastly greater angle than heretofore; while the means of observation have multiplied, the instruments of research are far more powerful and more numerous, and the storehouse of accumulated facts awaiting co-ordination is overwhelmingly full. We have learned both how great the universe is and how small; what a microcosm after all is the solar system, what a macrocosm the structure of the atom. We are able to discuss the chemistry of the stars. We can with our own eyes behold the skeleton within a living man, and see his heart beating—can even watch the progress of digestion in certain cases. We have learned how to preserve in permanency accurate automatic pictures of men and of events, and can register and even reproduce the tones of their actual speech. We have seen the air we breathe condensed into a liquid and frozen into a solid. We have been taught how to manufacture light out of electrical discharges. The synthesis by the chemist of organic substances proceeds in an ever-widening circle of triumphs. To-day we can manufacture by synthesis sugar and indigo; to-morrow it may be albumen or cellulose; protoplasm itself, though it may be far off, is not beyond the possibilities of which the chemist dreams. The mechanical theory of the universe, due to Kepler, and Newton, and Laplace, has been extended by the discovery of the principles of energy, and the formulation of them in the laws of thermodynamics. The sciences of optics and electricity have become one, being parts of the science of the ether. The discovery of the radio-activity of certain elements and minerals, with their singular emanations, has revealed a new and surprising field of research. The recognition of the electron has given a new basis to chemical hypothesis; and Dalton's atomic theory, which won its way by its general correspondence with observed facts, is being swallowed up in a chemistry still more fundamental.

If the vast complexity and beauty of the universe as it was known to our fathers could excite their wonder and imagination, how much more must ours be excited by the immense and marvellous development that has been opened in our time. But it is not alone in the physical sciences that such developments have come about. Biology has made advances almost equally great. The physical bases of life have been explored as never before. Diseases which formerly baffled the skill of the most experienced physician have been discovered to be due to specific micro-organisms; and we have learned how

to combat them by antiseptic and aseptic treatment. For a whole class of organic poisons known as toxins, antitoxins have been found, and the processes of manufacture of them by cultivation have been worked out. The immense part played in all organic life by ferments has been discovered and partially explored. Biology has been found amenable to statistical mathematical treatment; even the laws of heredity are becoming clear. There has also been a remarkable advance in the study of psychic phenomena, and psychology has found new generalisations from which fresh advances may be expected.

The methods of science have penetrated into the work of scholars and historians. Antiquarian research has taken new lines. Scholarship is daily becoming more constructively critical and less pedantic. The study of ethnology has thrown a flood of light upon many puzzling points of ancient lore. Such a work as Frazer's *Golden Bough*, antithetical as much of it seems to the religious mind, cannot fail to produce an immense and clarifying effect upon the study of the ancient religions of the world. It is useless to denounce such sincere and profound investigations because we do not like the conclusions to which they lead. If the facts are those which have been gleaned, there are men of intelligence who can draw their own conclusions from them, and can confute the author if he is wrong; but the facts remain. One thing the author of that book has made abundantly clear, that in every primitive religion of mankind there is an admixture of folk-lore and myth interwoven almost inextricably with glimpses of the truth. No one can read it without being profoundly impressed with the weight of evidence which it adduces; and none who sincerely hold the religion of Christ can leave it without the conviction that not even the purest of religions has in the historic past escaped from the inevitable consequences of its human environment; nor can he rise from the perusal of the treatise without the earnest prayer that the spiritual teachings of Christ may be purged from such accretions of human origin.

For, the restatement of religious truth in terms adapted to the present age has indeed become a pressing necessity of our time. Alike from the leaders of the various Christian churches and from those outside the borders of any church, we hear the complaint that to an increasing degree Christianity is ceasing to serve the needs of our age. The preachers and teachers complain of the empty state of churches and chapels, and denounce the indifference of the people: while the columns of the socialist newspapers (such as the *Clarion*) declare roundly

that Christianity is played out. But the people will be indifferent if those who profess to be leaders of Christian thought are blind to the changes that are going on all around them, and address the men of the twentieth century in terms of the sixteenth or of the sixth; and the socialist writers would be quite justified in declaring that Christianity was played out, if Christianity meant no more than they can see in it—a mass of external observances and ceremonials tied up with formal beliefs in a number of metaphysical propositions which to them are unintelligible.

But no one who earnestly desires to see a reconciliation between science and religion, no one who really believes in the Oneness of God's Universe, no one who sincerely regards the religion of Jesus Christ as intended—divinely intended—for the regeneration of mankind, can for a moment admit that Christianity consists (either wholly or essentially) in either the ceremonials which are observed within its churches and chapels, or in the metaphysical propositions embalmed in its orthodox creeds. Common honesty at least will compel them to acknowledge that the primitive Christian church existed for at least a century or more before any of the three Creeds was formulated; that infant baptism is never once mentioned in the Christian Bible; and that the celebration of the Eucharist, whether in Saint Peter's or Saint Paul's, is a totally different affair from the simple evening meal which Christ shared with His disciples. No more need be said here on this point. There are amongst sincere and devoted Christians some to whom these later developments of sacramental Christianity are entirely helpful, precious, and sacred; there are others equally sincere and devout who regard them as wholly non-essential, or even as hindrances to the spiritual life. But none of them would say that there is nothing in Christianity except ceremonies and creeds. Behind ceremonies and creeds there lies something that if all these were wiped out would remain—the revelation of God to man in the soul, and the revelation of God to man in the face of Jesus Christ. One who after many years of thought has deliberately decided to leave aside as futile and unedifying all metaphysical disputes as to the particular way in which the divine and the human were combined in the person of Jesus Christ, and who therefore abstains conscientiously from either Trinitarian or Unitarian views, may be permitted to place on record an acknowledgment how in that reservation of belief, that deliberate suspense of judgment, that deliverance from partisanship, he has found an



immense spiritual gain and an enlargement and deepening of faith.

Man is possessed of a religious faculty, of a something which manifests itself to him in his conscience, something which brings to him the elemental perceptions of mercy, justice, love ; something which not only enables him to distinguish more or less clearly between right and wrong, but which influences him towards a choice of conduct. Whether it be regarded as a single faculty or as consisting of several, we must treat the fact of its existence as beyond dispute. It brings to man a consciousness of something which, though invisible, intangible, immaterial, is greater than himself ; something which he did not make and of which he cannot rid himself ; a spiritual environment which, though in one aspect it seems to be independent of him, in another seems to be within himself. It is in the recognition of this elementary fact in human consciousness that religious thought begins. The possession of this consciousness is not confined to any one race or tribe of men, nor to any one age. It is a common property of the human race, however various the systems of religion which have grown up upon it. Doubtless it is more highly developed in some individuals and in some races than in others. But being thus shared amongst the human family it becomes an objective fact, a matter of evidence, not to be ignored or ruled out as a product of imagination. But beside being thus shared by the race, it is in a peculiar sense the property of the individual. Whatever he may learn of the workings of the religious faculty in others, his knowledge of it at first hand, as it lives within himself, is to him a much more real and vital matter. Whatever may be the evidence from without, the conviction from within is, at least in most cases, far more cogent. The instinct of religion is then innate, as natural as the instinct of hunger, or of self-preservation, or of sex. The existence of this instinct constitutes a domain of human experience, concerning which the facts may be collected and co-ordinated, and their laws discovered. To investigate facts and co-ordinate them, and to deduce conclusions is, however, the work of another faculty, that of reason. Hence in the discovery of religious truth both faculties are essential. But because one faculty has the function of perceiving, and the other of co-ordinating or testing that which is perceived, there is no possibility of denying to each its work. In this connection we may recall an aphorism propounded by Victor Hugo: "Il y a aussi une philosophie qui nie l'infini. Il y a aussi une philosophie qui nie le soleil. Cette

*philosophie s'appelle cécité.*" Because these perceptions are arrived at, or communicated, through a faculty that is not the reason, we must, therefore, neither on the one hand deny their reality, nor on the other refuse to apply our reason so that we may understand them. None of our faculties—that of sight, for example—would be of real use to us, did we not use our intellects to comprehend the perceptions afforded by the faculty that receives them. The intellectual testing of religious perceptions is therefore a prime duty.

But what is it to which this religious faculty impels the seeker after truth? He finds himself, in common with all Christians, Brahmins, Buddhists, Moslems and Jews, impelled toward an ideal of perfect being, of a Most High. He finds himself in the presence of a conviction that He is: he experiences an indestructible impulse to worship that which he feels to be Best. He may have gone further, as many of us have done, and may have found that in none of these religions he can discover a higher ideal of righteousness than in the Bible of the Jews, and in none a more sublime example of human devotion than in the records of the life of Jesus Christ, whom, whether human or superhuman, as His followers hold Him to be, he feels to represent the supreme development of human character, a presentation of the divine possibilities in man, nay, even a revelation in human form of the Divine. Alike in obedience to the religious instinct within him, and in wondering admiration of the perfect life, how can he, having travelled thus far in the spiritual pilgrimage, but attempt at least to become a follower of Christ? Nay, if he be a real truth-seeker, one who has no other aim than to find and follow truth, there is for him no alternative; follower of Christ he must strive to be; nay, by that very striving a follower of Christ, at however great a distance, he has already become.

To such a one, whose religion is thus an inner conviction, not founded on any external authority, no intellectual proofs of Christianity are needed: none can replace the personal revelation that is his own. Arguments founded on "analogies" and "evidences" are largely wasted on him. He needs no miracle-mongering to convince him. Nay, he will hold to his faith in Christ in spite of all the miracles that a credulous and non-scientific age heaped up around the historical narratives of His birth and life and death. Not even the wildest of them—and the orthodox Church rejected many more than it retained—will shake his faith. He knows that exactly the same kind of sacred

legend has grown up amongst every primitive people around any hero of commanding personality.

To such a one the pious legends woven about the Christ will appear just as natural, just as right in their place, and just as unnecessary of belief now, as any of those narrated of Moses, or Buddha, or Plato. In a primitive people the ascription of such legends was one way of expressing sincere adoration, a pious act quite irrespective of the historic facts. There is a frame of mind which regards the adoring legend, because it is adoring, as of vastly greater moment than the historic truth, because it is true. Those who have never inquired into this wonderfully interesting branch of human history, or who have never even attempted to comprehend that frame of mind, cannot understand how the reverent seeker after truth in these days can frankly admit that some of the things supposed by our forefathers to be a vital part of religion are myth, and yet not lose his reverence towards those earlier ones whose pious hearts wove, repeated, believed, and were even edified and spiritually strengthened by believing those legends. To each age its own conception of the divine stands to serve its own purpose. And the age which finds it better to hold simple unvarnished truth than to weave pious fancies, must not harshly condemn the age which thought it greater honour to God to weave these pious fancies than even to ask what the facts were. It will not do for the twentieth century to rise up in judgment against the second century, nor for the Western mind to rivet condemnation upon the Eastern, because the Eastern mind of the second century took different views of life and truth from these the Western of the twentieth century takes. To the uninstructed of all ages that which is abnormal has always presented itself as something sacred. To the oriental mind, untutored in science, the abnormal still always presents something calling forth an instinct of reverential worship. Of very recent growth, even in the better educated of westerns, is the idea of the reign of law. We forget too often that in this respect a whole chasm lies between the England of Edward VI. and the England of Edward VII. Only those who either fail to understand or else despise the reign of law and all that the phrase connotes, can continue to suppose that the truth of any doctrine can be established by the occurrence of some abnormal phenomenon. So convinced are all the clearest thinkers on this point, so scrupulous in their regard for ascertained truths, that they will rightly demand for any abnormal occurrence a testimony of evidence much more strict and

precise than that which is required for an occurrence of normal kind.

Only those who misunderstand the reign of law or ignore it can hold an abnormal event to be more sacred than a normal one. On the other hand those who have attained to this scientific clearness of vision, and who can see as a simple and obvious truth that in abnormality there is nothing of itself that is sacred, that the normal is just as sacred as the abnormal, must not, because it is obvious to them, despise or condemn those who in the pre-scientific ages did attribute some sort of sacredness to abnormality.

There are still those, and possibly they are still a majority amongst professed Christians, who would think it derogatory to the person whom they worship as wholly God as well as wholly man, to be a man in the fashion of His birth as well as in the fashion of His death. Let us honour them for their sincerity of heart and for their reverential souls even when we deem their sincerity and their reverence to be founded in this respect on no adequate basis. If we find ourselves in the cause of what we consider truth unable to share all their beliefs, let it be ours to see that we neither plume ourselves on any superiority of discernment, nor fall behind them in the devotion with which inwardly and outwardly we follow the Master.

Our minds are not all constituted alike; it is impossible for us all to see truth in the same aspect. But we can all follow truth as it is discoverable by us, and we can all pray for a clearer revelation of it. To our own Master we stand or fall. There are idols of the temple as well as the idols of the cave, and of the tribe, and of the market-place. It has been largely the part of scientific investigation to show us how well-meaning piety has not always held a clear distinction between idol and emblem, between the symbol and the thing symbolized; and "Nehushtan" has had to be the verdict pronounced, and still will have to be pronounced, over some of the survivals before which men, thinking to worship God, have offered incense, and bowed themselves down.

It is for this cause that as our convictions deepen and strengthen we must be the more ready to preserve open minds towards the convictions of others, to hold judgment in reverential suspense even toward some things which large bodies of devout men have regarded—perhaps for centuries—as closed questions. Revelation has not stood still, nor will it in our time. We stand not on the limited territory

where our forefathers stood: we have a larger heritage, we look out upon a larger landscape, there are before us greater heights to be climbed. Why should we feel anything but hope and courage in the larger vision? We are no longer children, and must look to outgrowing many of the thoughts and even of the beliefs which were accepted as final in the childhood of the race.

It is well known that one of the first-fruits of the invention of the telescope was the discovery of the spots on the sun. History records that the discovery was denounced as impious; and the doctrine that there are sunspots was banned as heretical. It is narrated, and the narrative is of significance to-day, how an ecclesiastic being invited to examine for himself and to see whether there were not spots on the sun, refused even to put his eye to the telescope for fear that he should see the spots which the astronomers asserted to be there, and so discredit should be brought on the reputation of Saint Thomas Aquinas.

That same spirit which first denounces the results of investigation, and then refuses even to look whether they exist, is by no means extinct, as the recent correspondence on Faith and Reason in the columns of the *Standard* has shown. To fear that which one does not understand may be natural; but to refuse to try to understand is a defect of character worse than cowardice. Those who pin their religious faith to an outward authority have had many shocks of late, and may need more for their soul's health. The spirit of inquiry cannot be stemmed by an appeal to the fourth century or to the sixth. If men ask us to accept as final the decisions of the Council of Nicea, we are bound to inquire whether that body had before it all materials needful for a *final* judgment, whether history has shown its composition to be representative and unbiased, its deliberations to be conducted in the scientific spirit of calm inquiry, its decisions to be taken without heat or partisanship. Nay, even if in all these respects it had been perfect—and alas! in some of them it was a miserable failure—the question would still remain why any thinking person in the twentieth century should be bound by the thoughts of the fourth. The fact is we are not bound by the decisions of the Council of Nicea. It has closed no question which we are not at liberty to reopen. Except to those who are in bondage to ecclesiastical systems, there are no closed questions that a reverent mind may not beneficially reconsider. We have as much right to reconsider the problems of religion in the light of our own age and of its

special revelations, as the men of any former age by the light of theirs. There is an open door before us, which no man, and no body of men, alive or dead, can shut. We cannot be denied the right to look through the telescope lest we should see spots on the sun. When, forty years ago, Bishop Colenso drew general attention to that which devout scholars had already several times observed, the "stratification" now so evident in the books of the Pentateuch, he was hounded out of the communion of the Orthodox. Even now there are pious souls who refuse to read his scholarly works—lest they should see spots on the sun! We are to a lesser extent witnessing a like attitude assumed toward those who in our day are pointing to the undeniable evidences of stratification in the composition of our Gospels. It is not a question of science but one of scholarship. Scholarship is now in possession of the records of ancient Babylon and ancient Egypt, which antedate our Bibles and which were not known until recently. Already these have been sufficiently deciphered to throw much light upon the stratification previously observed, and have vindicated the earlier perceptions of the scholars.

All the more reason have we, who can from a lower plane appreciate the labours and conscientious care of a scholarship that is itself far beyond us, to keep that open mind which the study of science continually reminds us to be essential in all true progress. Depth of faith for some of us is measured not by the quantity of pious beliefs which we can accept, but by the simplicity of those which we find needful for guidance and conduct. A man's religious life consisteth not in the abundance of the beliefs which he professes. Credulity is not faith. Even in spiritual things there is a sacred renunciation of the self, which enables one to lay aside many hindering things that are but old garments inherited from our forefathers. When we observe the greatest source of hindrance to all united work for the spiritual betterment of mankind, to have been those endless theological controversies which have embittered and estranged the earnest and the devout, and have been ever followed by persecution and spiritual cruelty, shall we not at least declare that in the name of the Master whose we are and whom we serve, we will have nothing to do with them or with the un-Christ-like spirit that characterises them. We need to have faith enough to believe that suspense of judgment is often a more sacred duty than acceptance of any particular dogma. For our age one of the greatest blessings that could befall us would be to possess that reverential open mind which

rises above all bigotries, scientific as well as religious. For while we need knowledge and insight, just as much do we need reverence : reverence for the truth because it is true, wherever we find it. If in the sole pursuit of truth we find ourselves called upon as a sacred duty to renounce some things hallowed by usage and pious association, that renunciation must be itself no hasty act, no passing impulse, no wilful breaking away. It must be under the supreme conviction that it is required of our hands. Return to the simple faith long overlaid by tradition and sacramentalism may not be easy, but it may be none the less a duty laid upon us. The renunciation with which for most of us the restatement of religion necessarily begins, must be a renunciation not for renunciation's sake, not born of spiritual pride, no truckling to popular pressure, no weak compromise for the sake of intellectual peace. It must be a renunciation made in obedience solely to the dictates of truth, a renunciation *ad maiorem Dei gloriam*.

#### DISCUSSION.

Dr. WALTER KIDD.—I have been asked to move a vote of thanks to Professor Silvanus Thompson, thanking him for his kindness in coming this afternoon and putting before us this valuable address ; we recognise the value of the source from which it comes, from one who is well known for his Christian character. You will see how valuable it is for us to have this address presented to us from such a source. We have all been brought into a high plane of thought, into spiritual regions, and into regions of high science, and we have heard an address which is marked by extreme clearness of thought and loyalty to truth on both sides ; and I could only wish that our President had been able to be present to the end of this address, that he might have expressed the value of evidence as it has been presented to us ;—it is a question of evidence, all through, and the task remaining for us is simply to interpret the evidence. We shall all be set thinking on these lines and be prepared to learn much more. We may be startled to find we have to learn so much. Years ago we thought we knew a great deal more than we do now,

but we must be still learning—religion and science are progressing and we must be prepared to learn more and more. Let us show we are of open mind and desire to recognise the truth.

Lieutenant-General Sir HENRY GEARY, K.C.B.—It gives me great pleasure to be allowed to second this vote of thanks to Professor Silvanus Thompson. I am sure we have all listened to it with the greatest possible interest, and I think it has been a great opportunity for us to have heard the subject handled this afternoon by so high an authority. It would be quite premature to attempt to make any remarks upon the paper, because when it comes to be printed it will require most of us to take it home for careful study; but I think an additional reason for our thanking Professor Thompson for coming amongst us is the particular era at which this paper has been read. Even the most careless cannot be blind and deaf to the unsettled state of the minds of people at the present moment. It is a time when every thinking man and woman has to go to the foundation of the faith in which they have been brought up and examine it by the light of modern study, and I think in a few words we can sum up the Professor's teaching, and that is, that perhaps the greatest crime a man can commit in the twentieth century is to close his mind to any influx of light.

Mr. MARTIN L. ROUSE, B.L.—As one deputed to ask Professor Silvanus Thompson to come to lecture before us, and who has heard him most delightfully hold forth to large audiences of the British Association an exposition of electric power, I should like to concur in the vote of thanks that is now being given; but I would say I am most firmly convinced that the evidence that we have of the truth of the holy word of God, the Bible, as it stands, is overwhelming. I would also like to call attention to this fact, that this very age is foretold by the Bible in more than one way. One way is that when Daniel was about to close up his prophecy the angel said to him: "Shut up the words and seal the book, even to the time of the end; many shall run to and fro, and knowledge shall be increased." There, in that very book we have embodied this most distinct prophecy of the character of the age just before the winding up of God's purposes and the setting up of Christ's visible kingdom upon the earth.

The CHAIRMAN.—The Resolution which has been moved, seconded and now spoken to, is that we present our best thanks to



Professor Silvanus Thompson for the address now delivered, and our thanks to those who have read papers during the session.

Of course, an old man of eighty-three, I stand here as one of the children having yet not got beyond childhood, and am still wrapped up in some of the old arguments of the early, first, second and third century beliefs. But our resolution is by no means that we are prepared to accept all that Professor Thompson has put before us, but that we still owe our thanks to him for his address.

Rev. JOHN TUCKWELL, M.R.A.S.—Mr. Chairman, I rise to propose that our very best thanks be given to the Lord Chancellor for kindly promising to come, and remaining with us as long as he could, and to General Halliday for having so kindly and promptly taken the seat which the Lord Chancellor would otherwise have occupied. Perhaps I may be allowed to say a word or two concerning the basis of this Society, and if I refer to what has been said this afternoon I hope it may not be out of place. The Society professes to maintain an open mind, both in the direction of science and in the direction of religion; and I hope it is the endeavour of all to do so. We, I trust, recognise that no religion can be accepted by us as true which is not strictly in accordance with reason; in the same way as we regard no fact of science as being acceptable to the human understanding which is not in accordance with reason. But I may be permitted to say that there is a mistake somewhere. What is science but the systemisation of the facts of nature as known to man? I think that is a correct definition. Taking that as correct there is, of course, ample ground for recognising changes and advances which science may make; but I think it ought to be recognised that the changes and advances are simply in human knowledge. Facts of science do not, and cannot, change until the Almighty Creator shall see fit to introduce some new fact. We know that electricity existed centuries ago before it was discovered. There have been no changes in the facts; what has changed has been the knowledge of man concerning them. On the other hand, what is religion? or what is theology? but a systemisation of the facts concerning the relationship between God and man. These facts are the same to-day as they were thousands of years ago; and there has been no change in the relationship between God and man. Theology has made progress in the same way as science has made progress; and progress in theology can

only be a modification of man's knowledge concerning the facts, until the Almighty Creator shall see fit to introduce some new fact, or modify existing facts concerning the relationship between man and Himself. We can know very little concerning this relationship beyond that which He sees fit to make known to us. "Man by searching cannot find out God." Whence are we to look for the revelation of the mind of God on these matters? There is no other source whence we can obtain any information except the Scriptures. I know of none other. I know of no truth that has ever been advanced for the acceptance of man of a general character which cannot be found in the Scriptures. If that be so, then I think it becomes us to search our Bibles, and it may be that in the search for truth there, we shall be able to correct any mistakes into which we may have fallen.

May I be permitted to say concerning archæology that whilst modern criticism has spoken of the different "strata" in the Old Testament Scriptures, and has suggested that something of the same kind may be found in the New Testament, I do not know of a single fact which has been revealed to us by archæological knowledge which supports the modern theories concerning these "strata"; so far as I understand the question, it is purely hypothetical.

Rev. CHANCELLOR LIAS, M.A.—I have been asked to second the Resolution of thanks to General Halliday and those who have taken part in the present meeting, and I am sorry that I do not oftener appear here. It is nearly thirty years since I read a paper, but I have been a member of the Council almost consecutively since then; and so as the question has been raised by Mr. Tuckwell about the basis of the society to which one belongs, perhaps one has a little right to speak for it. I most cordially concur with Professor Thompson that we are bound to keep an open mind. It is a most wicked thing to "close one's eyes to the telescope," but I must ask whether sometimes one is not asked to see something that is not there? About modern science there is one thing I notice, that it deals largely on assumptions. Let us make sure that we shall see the thing, and do not let us assert that it is *there*, and then call upon people to see it, when the very reverse is the fact.

I think I caught something from Professor Thompson about holding the truth because it is the truth. Everyone I hope wishes to do that. What is the truth? Is the truth contained in the

Revelation of God which is handed down, or is it contained in what are said to be the ultimate conclusions of science in the twentieth century? I remember people talking about the nineteenth century, and in a very high-minded way a curate uttered a philippic against this so-called nineteenth century. Well, this is the twentieth, and then there will be the twenty-first, and the twenty-second, and the twenty-third century, which may negative some of the things which are held at the present time.

I should like to correct a mistake which some people fall into about the Fathers of the Council of Nicæa. It is supposed that the Nicene Fathers took upon themselves to say, "this is the faith which men ought to believe because we say so." They did nothing of the kind. When Constantine brought ecclesiastical authorities from all parts of the Christian world, he said :—Here is a question to be settled. Will you kindly tell us, you who have come from France, from the East, from Egypt, can you tell us what are the doctrines of Christianity you have believed in your various localities? Then they all decided that it had been handed down that Christ was "of one substance with the Father." The answer shows the opinion of Fathers of the Council which has been handed down from time immemorial; and therefore let us understand that the Fathers were not commissioned to dictate to us what we ought to believe.

I think we ought to thrash everything out, and I hope the subject of the address may be discussed at a future meeting of the Society, when all will have an opportunity of expressing their opinions upon it.

The meeting closed with a vote of thanks to the Chairman.

## ORDINARY MEETING.\*

PROF. LIONEL S. BEALE, F.R.C.P., F.R.S., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following candidates were put forward by the Council for election :—

**LIFE MEMBER** :—Rev. Dr. Cushing, President of the Baptist College, Rangoon.

**MEMBERS** :—Professor William Galloway, F.G.S. ; Alexander Finn, Esq., H.B.M. Consul, Chicago.

**ASSOCIATES** :—Sir Thomas Wardle, F.G.S. ; J. Heald Jenkins, Esq. ; Rev. W. H. Frazer, D.D. ; Rev. Alexander Irving, D.Sc.

The following paper was read by the Author :—

### *THE RIGHT WAY IN PSYCHOLOGY.* By Rev. F. STORRS TURNER, B.A.

1. *Definitions.*—What is psychology ? Different answers are given. To Hume it meant the “science of Man,” “of human nature itself.” Some living psychologists think that the subject-matter of the science is “the phenomena of mind” (Sully) ; “the phenomena of consciousness” (Baldwin) ; “mental process” (Stout) ; “psychical events” (Bosanquet). These definitions are equivalent, or nearly so. They suggest fundamental questions—such as, a phenomenon of *what* and to *whom* ? is *mind* identical with *consciousness* ? is there any *known being* called mind ? Wundt considers that *the whole of experience*, that is, according to his notion of experience, all being of every kind, is the province of psychology—although *immediate* experience is its special subject-matter. Külpe takes psychology to be “the adequate description of those properties of the data of experience which are dependent upon experiencing individuals.” Herbert Spencer’s definition stands apart. His psychology studies “*the connexion between two connexions*”—these being “the connexion between the internal phenomena and the connexion between the external phenomena.” In another place we find it described

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\* Monday, December 5th, 1904.

as "an inquiry concerning the nature of the human mind, and an inquiry concerning the nature of human knowledge."

2. *Our definition.* In this essay, psychology is to have only one meaning. Verbally, it is Hume's—with the exception that instead of "science" I prefer the word "study." Practically Hume's psychology is a study of the human mind. In this essay, not *mind* but *man* is the subject-matter: man the embodied mind, or the ensouled body—in popular speech, man as body *and* soul. We are to consider the whole real man, the living unity, as we know him in experience. We desire to understand *ourselves*—not only each one of us himself; but each one: himself and his fellow-men. It is essential for the subsequent discussion, that this definition shall be held fast in its integrity.

3. *The inquiry proposed.* Although their definitions vary, I assume that psychologists all have before their minds the same or similar given facts, which they try to understand. We have not time to review the history of psychology and to describe existing psychologies. I propose to begin an independent inquiry. Can we discover by examination of the given facts, indications of the methods which psychology *ought* to take? If we succeed, the right way will be known: or, at least a right way. Whether there can be more than one right way, may be a subsequent inquiry.

4. *The first step.* The fact that there are different definitions obliges the psychologist to begin by explaining and defending his own definition. Physical science is not troubled in this way. The astronomer, the chemist, the geologist, and the rest all take their given facts as they find them, and being unanimous, go to work without any preamble. Why cannot we set to work as easily and confidently as they? Because the propriety of our definition may be challenged. This compels us to justify it, before we proceed. To do this we must consider *given facts* generally, what they are, and how they come to us; and then, whether the given facts of psychology are found among them.

5. *The meaning of "the given."* Why do we speak of some things as *given* facts? We mean that the given things, sometimes called "immediate psychical facts," are present to our consciousness, *before* the exercise of our thinking powers upon them. It is somewhat difficult to draw the line sharply between the *before* and *after*; for in the first perception of anything, or any event, the mind has its part. Still there are cases in which this part seems to be passive rather than active,

When the mind *receives*, the things are *given* to it. Such reception, by repetition, becomes recognition—a kind of knowledge; but for the most part we do not *understand* things until *after* we have thought about them. Our thinking, except in cases where it leads to some physical action upon the thing: or some mental action, if the thing is a mind; does not alter the thing. Nevertheless the thing is different *to us* because now we understand it; that is, we attribute to it characters of which we were not at first aware; and in some cases, characters which never come within the range of direct perception. For example, the sun, moon, and five planets are visible in the sky: they are given facts; also their motions are visible facts. But the solar system is not a given fact: it is an inferred fact, which cannot be seen by human eyes. In this case the distinction is evident. In innumerable cases it is not so. The given fact and our subsequent understanding of it become welded in a concept; and we come to imagine that we perceive what in reality we do not perceive, but conceive. No practical harm would ensue, if our understanding were always correct. But we make mistakes. Once there was to human thinking no solar system but a geocentric system. The case stands thus: human knowledge is a product of given facts and human reasoning. Experience has taught us that our reasoning is liable to err; whereas we have no ground for suspecting the given facts to be capable of error. Consequently, it is of fundamental importance that we should know *what* facts are given.

6. *First view. Things in General.*—We perceive innumerable things as different, and yet among them are like things. This is a practical certainty, and it seems to be also a logical certainty. For if there were no differences, if all things were exactly alike, there would be nothing to think about; and if there were no likenesses, the infinite multiplicity of unlike things would baffle all attempts to think. But I will not insist upon the logical necessity. It is enough that in our plain common sense apprehension of things, they *are* given to us as many, and diverse, and some of them alike. Taken together, these things are to us the given reality, which we have to understand as best we can. This given reality is the source and the basis of all our understanding; the standard and criterion of reality and truth. Whatsoever cannot be traced back to this is without sure guarantee, it may be mere fiction. Whatsoever is undoubtedly included within or can be certainly deduced from this, is truth.

7. *Second view. Ourselves and our environment.*—Having got

a firm grip of the original datum, we proceed to examine this more closely. As it appears to us at first sight, it is a vast and indefinite multitude, in which, by degrees, classes of like things are discerned. But on attentive consideration the multitude is seen to consist of a duality, *ourselves and our environment*. Inasmuch as this fact is the justification of our definition, it behoves us to consider it with the closest attention. In the first place it is obvious and self-evident that we ourselves as a class of animals are a part of things in general. We are visible and tangible things, to ourselves, and to each other. We are like one another, and we are different from other animals. We indubitably are a kind of beings, forming one small fraction of the innumerable whole. On this ground alone, our right to select *ourselves* as the subject-matter of a special study could not reasonably be disputed. But the case is much stronger than this. We are not given merely as a single kind on a level with countless other kinds; the whole given fact comes to us, as a whole or multiplicity *consisting of* ourselves and other things; a natural division is given in and along with the original datum. For the being *given* is only one-half of the fact, the being *received* is the other half. Without the *receiving* there could be no *giving*. We are not only visible and tangible things; we are also conscious, intelligent observers of things; we are able to receive the data; and so far as we know, we are the only creatures in this globe on which we live who are able thus to receive the given. Consequently, the distinction is recognized as fundamental in philosophy, under the name of *subject and object*; but unfortunately there is much confusion of thought covered by this phrase; so that we had better keep to plain language; *ourselves*, on the one hand, and *everything else*, on the other. It is important to note that what is given is a *plurality* of selves; or perhaps it is still better to describe the datum as a triad rather than a duality; *the self, other selves, and the environment*. I may mention here that *Der menschliche Weltbegriff* by Avenarius is an important contribution to the study of the original datum.

9. *Objections*.—In metaphysics the dual or trinal character of *the given* has been and is disputed. Solipsism, the assertion that *I* alone am the whole real given fact, and that besides me there is nothing else, is not worth notice. The opinion that the environments are as distinct as the individuals is more specious; but I think the question really is this—is our certainty that we all live in the same world immediately given or is it an inference? We must not discuss this point. I make no

pretence to a complete criticism of the original datum; my purpose is accomplished if I have shown that some attention must be paid to it, in order that our psychology may start securely.

But I may just point out that the philosopher, equally with the physicist and the psychologist, is powerless without some given fact or facts. He cannot reason upon nothing. And his first premiss must precede his reasoning; he cannot create it by reasoning. If he does not really believe and hold as certain truth, the threefold reality, the individual self, other selves, and the common environment, he must find some other standing ground. How can he even try to find this, without relying upon the threefold reality? It seems to me that he is stale-mated, he cannot move. Meantime, I think that we may truthfully say, that our given reality receives universal assent—the assent expressed in more than words—the assent of all human activity in every direction; not in ordinary life only, but in the more exact and systematic work of the sciences; and even in metaphysics also, for the philosopher, however he may speculate, really builds upon the three certitudes just like the rest of us.

10. *Guiding rules.*—We come out of our preliminary reflection with clear right to take *ourselves* as the given facts of our psychology. And I think we have gained something more than this. We seem now to be able to lay down two rules for our procedure—(1) Our study must keep close to the given facts; and (2) we must take the facts *as* they are given; we must not remove them from their context. These rules seem to shut us up to one method. The first forbids us to substitute anything else in the place of ourselves, as the subject-matter of psychology. The second forbids us to separate the self from its environment. In other words, we have to renounce, or to subordinate, the processes of abstraction, dissection, or analysis; and to study the real living self in his actual life in connection with his fellows and in connection with the external world. It will not be a breach of these rules, if we attend to some part or aspect of the self at one time, and another part at another time: but it will be violation of the rules if we attend to them *as having an independent existence*. The parts or aspects whatever they may be—sensations, presentations, ideas, emotions, faculties—exist only *in the self*; apart from it they are nothing real, nothing intelligible.

11. *The concept of the Self.*—Bearing these rules in mind, we ask—*what* is the Self? We have no complete answer—else



our study would be unnecessary. But we have some knowledge of the self: he is a complex being, a unity containing diversities: he is a developing being: not fixed, but changing. What we must seek for, is not a perfect definition, which is unattainable; but a conception which shall be certainly true so far as it goes, and which shall express not one or another of the self's diverse qualities; but his unity, and his diversities as included in the unity. Moreover, in accordance with the rule that the self must not be abstracted from, but studied in, the environment, our conception must include his relation to other selves, and to what we call the external world. Consideration of this relation gives the clue we are seeking. Things and people hurt or benefit us according to our position and behaviour in reference to them. It is our interest to avoid the injury and to secure the benefit. This brings to light one of the deepest and most important characteristics of human nature—*self-interest*. We are to some extent able to re-act against the environment so as to make it our servant, and to thwart it when it appears to be our enemy. In relation to sentient beings and especially to other selves, we have to do with beings who also have *their* interests. In such cases, our self-interest is not displaced, but supplemented by a larger interest, which we call *duty*. Duty brings with it *responsibility*: we call ourselves, and our fellow-men call us, to account for the neglect of duty. These three relations, self-interest, duty, and responsibility, affect all our dealings with the environment, and at the same time employ all the various capacities and powers of human nature. The sensations and all bodily functions are included in this conception of the self as a being who has interests; and likewise all mental emotions and powers—especially the intelligence and the will. I think we may express the concept thus—the human self is a being who takes an intelligent interest in his own welfare, and also in his duties, and responsibilities, *because* he can choose his own ends, and devise means for their attainment. This description does not pretend to be a perfect definition, but I submit that it is in accordance with the given facts. Our psychology would have to verify it in detail; but it is hardly rash to assume that experience has already verified it.

12. *Teleology*.—This concept of the self serves as a guide to further study. When once we have clearly apprehended that we are in a measure in charge of our own being, that we help to make or mar our own happiness, that beyond this, we either help to mend or to corrupt society, and have therefore duties and responsibilities towards others—we want to understand the

self *in order that* we may achieve our ends and fulfil our duties. For this purpose, what kind of knowledge is most urgently needed? Plainly, the first need is to know what are the *right ends*, that we may choose these; and inasmuch as ends are often conflicting, we need to know the order of their importance, and whether there is one supreme end which can curb the lower desires, and bring each of our various purposes into its right relation to the rest. I would call this branch of psychology, *human teleology*. This is usually omitted from psychologies, I suppose, because it is dealt with by ethics and religion. I cannot think that the omission is justifiable. It is like the tragedy of Hamlet, with Hamlet cut out. Moreover, ethics and religion would gain by being put in their rightful place. At present, many people regard these as optional subjects, inferior in value and in certainty to physical science. When human teleology is recognised as an indispensable part of the scientific study of human nature, these errors will be dispelled.

13. *Epistemology*.—After the study of ends the study of means, and the first of these is knowledge. Indeed, so universally necessary and of such fundamental importance is this means, that to some epistemology has been the first task of psychology, if not its only task. Locke and Hume are instances of this. So great is human interest in knowledge that, although this interest is at first, and even at all times, chiefly for the sake of other things, knowledge becomes also an end in itself, pursued for its own sake. And from this the next step is to give the primacy to knowledge, exalting it to the highest rank in dignity and in power. It cannot then be questioned that in any serious attempt to understand ourselves we must undertake the usually neglected task of trying to ascertain the nature and value of that thinking which we call *knowing* or *believing*.

14. *Three Grades of Thinking*.—After epistemology what should be the next chapter in our study? At this point I stop—declining the attempt to forecast any further step. The purpose with which we set out was to discover, if possible, the right way in psychology. If we are satisfied that we have succeeded it is enough. Actually to work out the psychology would be a great enterprise; and only in its execution could we ascertain how far it will lead us. That we should achieve a perfect understanding of ourselves is beyond reasonable expectation. The study of the human self is evidently an immense undertaking. Already we have seen that it includes teleology and epistemology, ethics and religion; and to these, history, law,

language, political economy, anthropology, might be added. Human physiology too cannot be left out. Indeed, half or more than half of the whole range of human thought falls under our definition, leaving another area, inferior in interest and importance, for the group of sciences which may be called physics. Plainly some limits would have to be self-imposed in a psychology written on our plan; and what these would be it is not easy to anticipate.

This view of the situation exposes us to an apparently formidable objection. "Your scheme," it may be said, "breaks down under its own weight. The magnitude of its scale makes it impracticable. A way that no one can follow cannot be the right way." I am not insensible to the force of this objection. The argument of this paper requires to be supported by the production of a psychology on the lines it indicates, in order to produce full conviction. But I think that the objection is not so formidable as it looks. Before our psychology has been worked out very far, the objection may disappear, and if not before, the epistemology, I think, would dispel it. One consideration from that source may be mentioned. It has often been pointed out that our thinking and our knowledge are not all on one plane, but are on different levels, in successive stages—the common-sense or pre-scientific stage; then "science" which raises this to a higher level; and after this, the reflective or philosophical stage. Between the second and third levels there is a great difference. "Science" takes much for granted. Philosophy refuses to pass anything uncriticised, delves down to the foundations, takes into account all the facts, and all the facts together as a whole and a unity; and, lastly, seeks and will be satisfied with nothing less than truth and certainty. Psychology seems to me to belong to the third and highest level; and therefore, to be compelled to start from the given certainties and to seek for a fuller comprehension of what is given. Its result and reward may be, not the acquisition of new information; but the clearer apprehension and firmer grasp of truth already within our reach but dimly and confusedly conceived.

15. *Body and soul*.—If our psychology were completed only so far as to the end of the first two or three sections, subdivisions would come to light. We should have, in considering human interests, to distinguish between bodily and mental wants; in studying knowledge, the bodily organs of sense would have to be considered. I think that we can foresee the advantage which our method will have in studying these topics. Its essential character will forbid the abstraction of any part or

aspect of the self from the whole self taken in connection with its environment. It will not fall into the error of mistaking what only exists as a part of, or a mode of a given reality, for an element or phenomenon having a real existence by itself; and the consequent error of imagining the whole as consisting of a number or succession of such parts. Body and soul, for example, belong to the original datum, but as a duality in a given unity. The self is one being, not two beings; and this one being is not a body, neither is it a soul or spirit. A body without a soul is not a human self, but a corpse. A soul without a body is not a human self—but a ghost; and ghosts are not given facts. The given fact is the human self, one being consisting of soul and body, a duality in a unity. (To avoid possible misconception, permit me to point out that the cessation or annihilation of the self when the body dies is *not* given fact. The self may continue to exist, and to exist as a unity, and as a duality in unity after the dissolution of the earthly body. Whether it does continue or not is also not given fact; it lies beyond the range of immediate experience.) To return to the really given fact—this is the self as a unity, containing diversities called parts, powers, modes, faculties, or by other names. To study these diversities is our proper business, but it is not our business to explain how there can be such diversities in the unity. There is nothing unnatural and nothing irrational in this existence of diversities within unity. All reality, so far as we can see, is of this nature. Everywhere we find examples. The body is a unity, but in it the eyes are different from the ears; the heart and the blood are different from the brain and the nerves; there is nothing puzzling in this, nothing which detracts from the unity of the body. If we encountered eyes alone, floating in the air, not belonging to a body, but perfectly detached; nevertheless, true living eyes, able to see, that would be a puzzle. Similarly, the mind, soul, or spirit is a unity of successive times and successive experiences, of receptivity and activity, of endless diversities, in one living unity. The union of body and soul in one living self is not an exceptional fact, but in harmony with the whole universe. No difficulty, no perplexity is felt, until we make the mistake of regarding the body as a real thing by itself, and the soul as another real thing by itself. The puzzle then is to explain how the two diverse entities ever got united; and how, being united, they can act and react upon each other. But it is not within our power to take ourselves to pieces; therefore we are not required to put ourselves together

again. When our psychology comes to consider body and soul, it will not be troubled in any way. On the contrary it will find this union of body and soul in one self quite congruous with the union of ourselves and the environments in one world. Its work will be to notice how perfectly this unity of body and soul fits into the unity of the universe. Destitute of a body, what could a human soul do or know in this world? How could it be aware of its environment? Without bodies, how could individual souls communicate their thoughts to each other? The given facts hold together and support each other, together constituting a system in which each member is essential to the whole.

16. *Free will*.—Again, our psychology will be untroubled by that insoluble problem—the relation of free will to determinism. The facts of volition, duty, and responsibility are solid certainties of the self—they are not imaginations or inferences, but immediate realities. It is as impossible to doubt these facts as it is impossible to doubt the facts of gravitation in physics. Determinism is a theory belonging to another region of thought—the attempt of the human intellect to comprehend the universe as a whole. We may feel the fascination which this theory has for the religious belief that God governs all, and for the philosophical imagination of a universe absolutely ruled by law and causation, but we need not be disquieted. No theory can undermine the certainty of given facts; while on the other hand it is easy to recognise the inability of the human mind to know everything.

17. *Conclusion*.—Whether there are two or more right ways in psychology is a question which must be postponed. An immense amount of useful work has been done by psychologists who have begun by analysis of consciousness, and have endeavoured to explain the self as a compound of simple elements, somewhat after the manner of physical science. Unhappily, in some cases, the result has been a doubt whether there is any self. Münsterberg in his *Psychology and Life*, and more fully, in his *Grundzüge der Psychologie*, has made an attack upon these “objective” psychologies, no reply to which, so far as I know, has appeared. I mention this to show that I am not alone in feeling that a new departure in psychology is necessary. Meantime I would fain hope that the arguments of this essay, now submitted to your judgments, will convince some of you that the method I have advocated is worth trying. It has the merit of keeping close to practical life. It does not promise to explain what the self *is*; but it recognises that the self

is *becoming*, is in process of evolution. This too is an immediate certainty. The self is becoming good or bad, wise or foolish, happy or miserable. Why do we want to understand ourselves? Surely that we may become good, wise, happy. The kind of knowledge most necessary for us is regulative knowledge—and, perhaps, for us, no other kind is possible.

#### DISCUSSION.

The thanks of the meeting were voted to the author of the paper, and a discussion followed.

Dr. SCHOFIELD considered that the author by his suggestion puts us on a very high intellectual platform. He thought that the radical defect of the present psychology was its tendency to limit mind to consciousness. It was this narrow concept which limits "the psychological mind" to less than half its real extent, that called forth Prof. James' scathing description of its present condition. He says that it is a study of raw facts; a wrangle about opinions, but has not a single law; that it is in the condition of physics before Galileo, or chemistry before Lavoisier.

Colonel ALVES said: It is well-known that as regards the moral character that the exercises of the soul very speedily make a great reformation in character. That is unlike mental or physical talents. For instance, a person without talents for music or painting would never make much progress.

I do not know what the practical result of a paper like this is.

What is the result? It seems to me that what we know in practical psychology is that we must first begin at both ends. There is only one thing that will reach deepest needs. It is well-known and it is a new birth. There is no doubt many people live in very good stable houses that last their time, though the foundation is only on the sand, but once the superstructure has been ruined nothing can be rebuilt except on the solid foundation of the new birth. There is a necessity for building on that foundation, and those who work with our Christian teachers have very speedily agreed as to how the same physical element can be developed and trained when we are on a solid foundation. It is not much use

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6. *First view. Things in General.*—We perceive innumerable things as different, and yet among them are like things. This is a practical certainty, and it seems to be also a logical certainty. For if there were no differences, if all things were exactly alike, there would be nothing to think about; and if there were no likenesses, the infinite multiplicity of unlike things would baffle all attempts to think. But I will not insist upon the logical necessity. It is enough that in our plain common sense apprehension of things, they *are* given to us as many, and diverse, and some of them alike. Taken together, these things are to us the given reality, which we have to understand as best we can. This given reality is the source and the basis of all our understanding; the standard and criterion of reality and truth. Whatsoever cannot be traced back to this is without sure guarantee, it may be mere fiction. Whatsoever is undoubtedly included within or can be certainly deduced from this, is truth.

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just going to drown a man in the canal near the house. My friend at once hastened out, and found a crowd of some hundreds of people gathered near the bridge, which spanned the canal, about two hundred yards from his door. He walked to the bridge to see what was being done. The canal was about twenty feet wide, and the bridge was built high in the centre in order that the boats might pass underneath it without difficulty. On the top of the bridge he found an old woman sitting in a chair, and at her feet lay a young man bound with ropes, so that he could not move. The old woman was the mother, the young man bound with ropes was her son, who, at her order, was about to be cast into the water and drowned. When my friend appeared, men were just arriving with heavy stones, which were to be fastened to the young man to make him sink. He was a bad son, and his mother was afraid he might commit some serious crime, in which case she would be sure to suffer, because the authorities would say that she had not brought him up well. As he would not listen to her exhortations, she decided to have him drowned, and then the danger would be removed. My friend protested against the whole proceeding, but after long consultation the only way he could save the man's life was by becoming surety for his good behaviour, really, by adopting him as his own son. The man was unbound, and my friend was allowed to lead him away; but he turned out to be thoroughly bad, and proved that it was not without reason his relatives had determined to drown him. My friend had an anxious time with him for about three years, at the end of which time the young man died. I heard of a similar case in Hangchow, but then there was no one to intercede, and the neighbours, by the order of the mother, actually dropped the son into the water and drowned him.

It was when Confucius was at the height of his prosperity at Loo, that difficulties arose. He had assured his followers that not only would his methods reform sovereign and people, but that neighbouring states would be so attracted by the spectacle, that they too would imitate the example set them. The result was just the opposite. The order and prosperity of Loo excited only the jealousy of the neighbouring states. The Duke of Tse said: "With Confucius at the head of its government, Loo will become supreme among the states, and Tse, which is nearest to it, will be swallowed up. Let us propitiate it by a surrender of territory." But after consultation with his ministers another course suggested itself. Eighty beautiful girls well skilled in music and dancing, and one hundred and

twenty of the finest horses, were sent as a present to the Duke of Loo. The present was accepted. The girls were taken into the Duke's harem, and the horses removed to the ducal stables. The Prime Minister and the government were neglected, and Confucius mourned that Duke Ting should prefer the songs of the maidens from Tse to the wise sayings of the sages of antiquity. As things did not improve, Confucius gave up his post and left the capital.

Confucius was now fifty-six years old. For fourteen years he was an exile, wandering from state to state, offering his services, but no one would employ him. "Your principles," said one of his disciples, "are excellent, but they are unacceptable to the Empire; would it not be well to abate them a little." "A good husbandman," replied the sage, "can sow, but he cannot secure a harvest. An artisan may excel in handicraft, but he cannot provide a market for his goods. And in the same way, a superior man can cultivate his principles, but he cannot make them acceptable." On one occasion, during his wanderings, he is said to have compared himself to a dog, driven from its home. He remarked, "I have the fidelity of a dog, and I am treated like one! But what matters the ingratitude of men? They cannot hinder me from doing all the good that has been appointed me. If my principles are disregarded, I have the consolation of knowing in my breast that I have faithfully performed my duty."

Although Confucius was not in favour with the rulers, yet he had many admiring followers, who have carefully preserved many particulars of the every-day life of their esteemed teacher. In his dress, we are told, he was careful to wear only the correct colours, viz.—blue, pink, white, and black; he carefully avoided red, as being the colour usually affected by women and girls. At the table he was moderate in his appetite, but particular as to the nature of his food, and the manner in which it was set before him. Nothing would induce him to touch any meat that was high, or rice that was musty, nor would he eat anything that was not properly cut up, or accompanied with the proper sauce. He allowed himself only a certain quantity of meat and rice, and though no such limit was fixed to the amount of wine which he drank, we are assured that he never allowed himself to be confused by it. Whatever the food was that was set before him, he always offered a little of it in sacrifice, with a grave, respectful air. When out driving, he never turned his head quite round, and in his actions as well as his words he avoided all appearance

of haste. We are told that he always had ginger on the table, and when eating did not converse. When in bed, he did not lie like a corpse, and he required his sleeping dress to be half as long again as his body. But during his wanderings he often suffered much. He tells us, "With coarse rice to eat, with water to drink, and my bended arm for my pillow, I still have joy in these things. Riches and honours acquired by unrighteousness are to me as a floating cloud."

Confucius was now growing old, and being weary of wandering from state to state, he had an earnest desire to return to his native place once more. History tells us that he retired to Loo in Shangtung, and spent his time in editing the *Book of History*, studying the *Book of Changes*, and writing the Spring and Autumn Annals. Having a strong presentiment at one time that his end was drawing near, he is said to have burst into tears, exclaiming, "The course of my doctrine is run, and I am unknown." "How do you mean that you are unknown?" asked one of his disciples. "I do not complain of Providence," he answered, "nor find fault with men that learning is neglected, and success is worshipped. Heaven knows me . . . never does a superior man pass away without leaving a name behind him. But my principles make no progress, and I, how shall I be known in future ages?"

One morning in the Spring of 478 B.C., he tottered about the house sighing:—

"The great mountain must crumble;  
The strong beam must break;  
The wise man withers away like a plant."

"If the mountain crumble," said one of his disciples, "to what shall I look up? If the strong beam break, and the wise man wither away, on whom shall I lean? The master, I fear, is going to be ill." The master answered, "My time is come to die." He went into the house, took to his bed, and on the seventh day he died. During his short illness, one of his disciples asked leave to pray for him, quoting from a book of prayers to the effect that prayer might be offered to the spirits of heaven and earth, but Confucius would not permit it, saying, "My prayers were offered long ago."

And so, at the age of seventy-three, the great man passed away; and on the banks of the river Sze, to the north of the city of Loo, his disciples buried him, and for three years they mourned at his grave. One of the most faithful, who built a hut near his grave, and lived in it for six years, mourning as for a father, said, "I have all my life had the heaven above my

head, but I do not know its height, and the earth under my feet, but I do not know its thickness. In serving Confucius, I am like a thirsty man, who goes with his pitcher to the river and there drinks his fill, without knowing the river's depth."

And so the Most Holy Ancient Teacher, as his disciples loved to call him, passed away unhonoured, and almost unknown. Little did the few followers, who mourned around his grave, realize that the one of whom they were taking leave, would in after ages number his followers by millions, and that his writings and sayings would be more attended to and obeyed, than perhaps the writings of any man who has ever lived.

But we must pass on now to consider his writings and teaching.

"What Confucius teaches is true; what is contrary to his teaching is false; what he does not teach is unnecessary." This was the creed of the Confucian scholar twenty-five centuries ago, and it is the creed of the Confucian scholar to-day. We may well ask, therefore, what did Confucius teach?

In the Confucian system everything centred in the family. The same virtues are required in the head of the family as in the ruler of the kingdom. The same respectful reverence should be paid by the children to the father, as is due from the subjects to the sovereign. "Heaven and earth existing," says the *Book of Changes*, "all things exist; all things existing, then male and female exist; male and female existing, then the relation of husband and wife exists; from the existence of husband and wife, follows the relation of father and son; father and son existing, then prince and minister exist; prince and minister existing, then upper and lower classes; upper and lower classes existing, decorum and propriety are interchanged." "Let the household be rightly ordered, and the people of the state may be taught." All the teaching of Confucius tended to exalt the man, he did not think much of the women. "A woman," he said, "is subject to man and is unable to stand alone, and therefore, when young, depends on her father and brothers, when married, on her husband, and after his death, on her sons. She must not presume to follow her own judgment."

It is difficult for anyone, who has not lived in China, to realize the difference between the reception given to a son, and that given to a daughter. No one welcomes the advent of a little girl; there are no congratulations, no presents; friends

and neighbours freely comment on the misfortune that has come upon the family. And too often the father, by means of a pail of water, or in some other way, will suddenly bring to a close the life of the little baby daughter, who, unwelcomed, has so lately entered his household. In a large country district to the south of the city of Hangchow, the people said that the baby's soul came with its teeth. A soulless baby, dying without teeth, was wrapped in a piece of matting, and left anywhere on the hills, generally being eaten by the dogs, but if the little one had cut even one tooth, the soul was supposed to be there, and a little box was therefore provided for the burial.

A short poem written about 825 B.C., that is about the time of the prophet Jonah, well expresses the feeling in China to-day, as it did the feeling in the country nearly 2,800 years ago. The poem consists of two verses only, one referring to the boys, the other to the girls.

"And it shall be, whenever sons are born,  
These shall be laid on beds to sleep and rest ;  
In loose long robes they also shall be dressed,  
And sceptres shall be given them for their toys,  
And when they cry what music in the noise !  
These yet shall don the scarlet aprons grand,  
And be the kings and princes of the land.

And it shall be, when daughters shall be born,  
These shall be laid to sleep upon the ground ;  
In coarsest bands their bodies shall be bound,  
And tiles shall be their playthings. 'Twill belong  
To these to meddle not with right or wrong,  
To mind alone the household drink and food,  
And cause their parents no solicitude."

Following the example of Confucius we must leave the little girls alone, and indeed the boys only would take far more time than we can give to them to-day.

There was nothing that Confucius thought more important than the education of the young. As we have already seen, that if, through neglected education, a young man went wrong, those, who had neglected to give the education, ought also to be punished. Even now in Central China, if a child be rude or call names, the most cutting thing that can be said is ; "I fear you have no father or mother," implying of course that the education had been neglected. At about six years of age the boy goes to school, and places his foot on the first step of that ladder which, if he mounts well, will give him a place in the highest offices in the Empire. At school the boy will have

to master the following books:—viz., *The Three Character Classic*, *The Catalogue of Surnames*, *The Thousand Character Classic*, *The Canons of Filial Duty*, *The Odes for Children*, and the *Juvenile Instructor*. Having been thoroughly instructed in these six books, the young scholar is ready to begin the Confucian Classics, and to prepare for the competitive examinations. Of course many boys, who have to earn their living, never get so far: they have to leave school early and begin to learn a trade, but it is the highest ambition of everyone if possible to be a scholar. The following extract well expresses the national sentiment of the Chinese with reference to the various occupations that may be followed:—

“First, the scholar; because mind is superior to wealth. It is the intellect that distinguishes man above the lower animals, and enables him to provide food, raiment, and shelter for himself and others.

“Second, the farmer; because the mind cannot act without the body, and the body cannot exist without food and raiment.

“Third, the mechanic; because, next to food and raiment, shelter is a necessity.

“Fourth, the tradesman; because as society increases, and its wants are multiplied, men to carry on exchange and barter become a necessity.

“And, last of all, the soldier; because his business is to destroy, not to build up society. He consumes what others produce, but does not himself contribute anything that can benefit mankind. Still he is, perhaps, a necessary evil.”

We will now briefly consider the Four Books and the Five Classics, the nine works which contain the writings and sayings of Confucius and his disciples, and which for hundred of years have formed the sole subject of the competitive examinations throughout the land. One has well said; “There is not much, from a westerner’s point of view, to commend these ancient literary productions, and yet the incomparable influence they have exerted for centuries over so many millions of minds, invests them, even for us, with an interest no book beside the Bible can claim.”

The “great learning” consists of eleven chapters which treat of four important subjects, viz.: The Improvement of Oneself; The Regulation of a Family; The Government of a State; and the Rule of an Empire. The following extract from the book forms a kind of introduction to the consideration of these important subjects:

“The ancients, who wished to illustrate renovating virtue

throughout the Empire, first ordered well their own States. Wishing to order well their States, they first regulated their families. Wishing to regulate well their families, they first cultivated their persons. Wishing to cultivate their persons, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they first extended their knowledge to the utmost. Such extension of knowledge lay in the investigation of things. Things being investigated, knowledge became complete. Knowledge being complete, their thoughts were sincere. Their thoughts being sincere, their hearts were rectified. Their hearts being rectified, their persons were cultivated. Their persons being cultivated, their families were regulated. Families being regulated, their States were rightly governed ; their States being rightly governed, the Empire was made tranquil." And so we arrive where we were at the beginning.

The second of the Four Books is the *True Mean*, compiled by the grandson of Confucius about the year 388 B.C. or before the days of Alexander the Great. This book depicts the character of an ideal Princely or Superior Man, who in all relationships of life preserves the golden mean, and is thus a model and standard of virtue to succeeding generations. "The Princely Man, in dealing with others, does not descend to anything low or unworthy. How unbending his courage ! He stands at the centre, removed from extremes, and leans not to either side. The Princely Man enters into no state, wherein he cannot be true to himself. If he hold high office, he does not treat with contempt those beneath him. If he occupy a lowly position, he uses no mean arts to gain the favour of his superiors. He corrects himself, and blames not others. He feels no dissatisfaction. On the one hand he murmurs not at heaven, nor on the other does he cherish resentment towards his neighbour. Hence the superior man dwells at ease, entirely waiting on the will of heaven." Speaking of the Princely Man, he also says, "Vast and extensive are the effects of his virtue ; it is like the deep and living stream, which flows unceasingly ; it is substantial and extensive as heaven, and profound as the great abyss. Wherever ships sail or chariots ran ; wherever the heavens overshadow, and the earth sustains, wherever sun and moon shine, or frosts and dews fall, among all who have blood and breath, there is not one who does not honour and love him."

Third : *The Analects of Confucius*, written by his disciples to

chronicle the utterances of their "Most Holy Ancient Teacher." Among the many remarkable sayings of Confucius, recorded in this book, certainly the Golden Rule he impressed upon his followers stands first. One of them had inquired: "Is there a single word which may serve as a rule of practice for the whole of one's life?" "Is not Reciprocity such a word," replied Confucius, "do not to others what you would not wish done to you." "What do you say," said a disciple, "concerning the principle that injury should be recompensed with kindness?" The master said, "With what then will ye recompense kindness. Recompense injury with justice, and recompense kindness with kindness." Some other sayings are, "I have found no man who esteems virtue as much as pleasure.—The perfect man is never satisfied with himself; he that is satisfied with himself is not perfect.—Patience is the most necessary thing in the world.—The perfect man loves all men; he is not governed by private affection and interest, but only regards right reason and the public good.—The superior man has nine things which he takes into thoughtful consideration. In regard to the use of his eyes, he is anxious to see clearly. In regard to the use of his ears, to hear distinctly. In regard to his countenance, that it should be benign. In regard to his demeanour, that it should be respectful. In regard to his speech, that it should be sincere. In regard to his doing business, that it should be with care. In regard to what he doubts about, to make enquiry. When he is angry, he thinks of the difficulties that his anger may involve him in. When he sees gain to be got, he thinks of righteousness."

The last of the series is the *Book of Mencius*, who lived about two hundred years after Confucius, 371 B.C., in the days of Plato and Demosthenes. Mencius has been regarded by many as one of the greatest men the Asiatic nations have ever produced. The following extracts will show what kind of man he was, and considering when they were written, they are certainly very remarkable. "I love life," he observes, "and I love justice, but if I cannot preserve both, I would rather give up life, and hold fast justice. Although I love life, there is that which I love more than life. Although I hate death, there is that which I hate more than death."

"Heaven, when about to confer a great trust upon any man, first exercises his mind with suffering, and his senses and bones with toil. It exposes his body to hunger, subjects him to poverty, and confounds his undertakings. By all these methods it stimulates his mind, hardens his nature and supplies his



incompetencies. . . . When men are distressed in mind, and perplexed in their thoughts, they are aroused to vigorous reformation. . . . From these things we see how life springs from sorrow and calamity, while death follows ease and pleasure."

It may be remarked in passing, that Mencius had a good mother. She is said to have moved her residence from the neighbourhood of a butcher's shop, because she would not have her little boy witness daily that which she thought might make him cruel.

Mencius, like Confucius, believed the nature of man to be originally good, though contaminated through contact with the evil of this world. All men are naturally virtuous, just as water naturally flows downward.

At the head of the Five Classics is placed the *Book of Changes*, an obscure treatise consisting of sixty-four short essays of a moral, social, and political character. It is said to have been composed in prison by King Wan, in the year 1150 B.C., that is before the birth of Samuel. It is in this ancient book that we first find mention of the Five Great Social Relations; they are those of Sovereign and subject, husband and wife, parent and child, elder brother and younger brother, and friends. If we apply the important word Reciprocity to these five social relations, we shall perhaps be able to form some idea why the Chinese nation has been able to hold together for so many centuries.

The second is the *Book of History*. It consists of a series of dialogues designed to give a brief history of China from about B.C. 2350 to 770 B.C. "This volume compiled by Confucius contains," one remarks, "the seeds of all things valuable in the estimation of the Chinese. It is at once the foundation of their political system, history, and religious rites, and the basis of their tactics, music, and astronomy. The knowledge of the true God, under the appellation of Shang-ti, is not obscurely intimated in this work."

The third is the *Book of Odes*, consisting of three hundred popular songs and poems, culled from a period covering more than a thousand years—from the days of Joseph's greatness in Egypt, to the era of the Babylonish captivity. It is most noteworthy that there is nothing in the whole collection which might not be read aloud in any company, in its full natural sense, by youth or maiden.

The following one of the Odes, translated by Dr. Legge, is given as a specimen :—

## A wife's lamentation during the absence of her husband.

"Away the startled pheasant flies,  
 With lazy movement of his wings ;  
 Borne was my heart's lord from my eyes—  
 What pain the separation brings !

"The pheasant though no more in view,  
 His cry below, above, forth sends,  
 Alas ! my princely lord, 'tis you—  
 Your absence that my bosom rends !

"At sun and moon I sit and gaze,  
 In converse with my troubled heart.  
 Far, far from me my husband stays ;  
 When will he come to heal its smart ?

"Ye princely men who with him mate,  
 Say mark ye not his virtuous way ?  
 His rule is, Covet not, none hate :  
 How can his steps from goodness stray ?"

The fourth is the *Book of Rites*. The original documents which form the basis of this work go back to 1112 B.C., that is, about the time of the disturbed days of the judges, when we are told, "every man did that which was right in his own eyes." "Even at that time, China was under the control of a methodical and effective system of national polity. Villages had their schools, and districts their academies." This book regulates the rites and ceremonies of the nation, and has done so for many centuries. One of the six governing Boards at Peking is specially charged with the duty of seeing its precepts carried out throughout the Empire. Both the Emperor and his people regulate their lives by the *Book of Rites*, and no one would dare to depart from the rules there laid down, even in the smallest matter. At marriages, funerals, and feasts, there is always a master of ceremonies, whose duty it is to see that all is done in accordance with the proper etiquette."

The following extracts from the Domestic Rules contained in this ancient book, though antiquated and trivial in detail, are interesting, as showing the respect paid to parents, even to the present day :—

"Men, in serving their parents, at the first cock-crowing must all wash their hands, rinse their mouths, comb their hair, bind it together with a net, fasten it with a bodkin, forming it into a tuft, brush out the dust, put on the hat, tying the strings ornamented with tassels, also the waistcoat, frock, and girdle, with the note books placed in it, and the leggings attached on

the right and left, bind on the greaves, and put on the shoes, tying up the strings.

"Wives must serve their husband's father and mother as their own. At the first cock-crowing they must wash their hands, rinse their mouth, comb their hair, and bind it together with a net, fasten it with a bodkin, forming it into a tuft, put on their frocks and girdles, fasten on their bags of perfumery, put on and tie up their shoes. Then they must go to the chamber of their father and mother, and having entered, in a low and placid tone they must enquire whether their dress is too warm or too cool. If the parents have pain or itching, they must respectfully press or rub the part affected. If the parents enter or leave the room, either going before or following they must respectfully support them. In bringing the apparatus for washing, the younger must present the bowl, the elder the water, begging them to pour it and wash, and after they have washed, hand them the towel. In asking and respectfully presenting what they wish to eat, they must cheer them by their mild manner, and must wait until their father and mother have eaten, and then retire."

The following "on reproving parents" is remarkable. 'When his parents are in error, the son, with a humble spirit, pleasing countenance, and gentle tone, must point it out to them. If they do not receive his reproof, he must strive more and more to be dutiful and respectful towards them, till they are pleased, and then he must again point out their error. But if he does not succeed in pleasing them, it is better that he should continue to reiterate reproof, than permit them to continue to do injury to the whole department, district, village, or neighbourhood. And if the parents, irritated and displeased, chastise their son until the blood flows from him, even then he must not dare to harbour the least resentment; but, on the contrary, should treat them with increased respect and dutifulness."

Also this. "Although your father and mother be dead, if you propose to yourself any good work, only reflect how it will make their names illustrious, and your purpose will be fixed. So if you propose to do what is not good, only consider how it will disgrace the names of your father and mother, and you will desist from your purpose."

But we must pass on to the last of the five classics; the Spring and Autumn Annals; which stands alone as the personal work of Confucius. It gives some account of his own times, covering a period of over two hundred years, from B.C. 722, that

is, shortly after the foundation of Rome. In one noteworthy sentence in this book, Confucius speaks of the Divine Being as "God all-wise, equitable, and one."

But we must bring to a close this brief sketch of the Four Books and Five Classics, remembering that there is not an educated man in China who could not repeat the whole nine books from memory. From the time that competitive examinations were introduced in the year 631 A.D., they have constituted the sole subjects for examination. Thus for upwards of twelve hundred years, the nine Confucian Classics have been the main study of every generation of Chinamen from childhood to old age. One has well said: "The effect of this complete absorption of the Confucian system into the national character has been to maintain the influence of the sage as powerfully, or even more powerfully, than ever. Buddhism and Taoism have found their adherents almost entirely among the uneducated classes, and even these reject all doctrines which are inconsistent with the teachings of Confucius. No educated man would admit for a moment that he was a follower of either of the above-mentioned religions; to him Confucius is guide, philosopher, and friend, and though fully recognised by him as a man, is worshipped as a god." In the eighteen provinces there are one thousand five hundred and sixty temples dedicated to the worship of Confucius, and in these temples, sixty-six thousand animals are offered every year to his spirit. The feeling of the Chinese people is undoubtedly expressed in the following lines, which form part of the sacrificial ritual:

"Confucius! Confucius! How great is Confucius!  
Before Confucius, there never was a Confucius!  
Since Confucius, there never has been a Confucius!  
Confucius! Confucius! How great is Confucius."

That Confucius was a remarkable man there can be no doubt, and his humility was one of his most striking characteristics. He always disclaimed originality, and declared that all his teaching was derived from the ancients, for whom he entertained the profoundest veneration.

"A transmitter and not a maker, believing in and loving the ancients." "I was not born a man of knowledge; I am naturally only quick to search out the truth from a love for the wisdom of the ancients."

"I am not virtuous enough to be free from anxieties; nor wise enough to be free from perplexities; and not bold enough to be free from fear."

"In the way of the superior man there are four things, to not one of which have I as yet attained. To serve my father as I would require my son to serve me; To serve my prince as I would require my minister to serve me; To serve my elder brother as I would require my younger brother to serve me; To behave to my friend as I would require him to behave to me."

"Shall I teach you what knowledge is? When you know a thing, to hold that you know it; and when you do not know a thing, to allow that you do not know it; this is knowledge."

According to Confucius, the first of all virtues, whether in a son or in a subject, is filial piety. It is this which distinguishes man from brutes; it is this which recognises the true relation between child and parent. "Filial piety consists in serving one's parents when alive, according to propriety; in burying them when dead, according to propriety; and sacrificing to them, according to propriety." "Of all things," said Confucius, "which derive their natures from heaven and earth, man is the most noble; and of all the duties that are incumbent on him, there is none greater than filial obedience; nor in performing this is there anything so essential as to reverence one's father; and, as a mark of reverence, there is nothing more important than to place him on an equality with heaven. Thus did the Lord of Chow; he sacrificed on the round altar to the spirits of his remote ancestors, as equal with heaven; and in the open hall he sacrificed to King Wan (his father), as equal with Shang-ti." This is one of the innumerable passages, which enjoin the duty of ancestral worship,\* which may now well be called *the religion* of the Chinese, for Confucianist, Taouist, and Buddhist, alike all rear the shrine for the ancestral tablets, and worship at the graves of the departed. This extract shows that, according to Confucius, a man ought to place his father on an equality with God, and the following incident will show that there are Chinese in our own day who strive to carry this principle into practice.

Only a few years ago a man in Canton committed a murder, and a warrant was issued for his arrest; but before he could be found, his son, a young man about twenty years of age, went to the magistrate and said, "I committed the murder." The son was arrested, tried, and, on his own confession, condemned to death. Soon all the people in Canton knew what had been done, and it was the one topic of conversation in the city.

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\* *Journal Vict. Inst.*, "Ancestral Worship," vol. xxxvi, p. 67.

When the day came for him to be beheaded, thousands of people accompanied the procession to the execution ground to see the young man die, to see the son die to save his father's life. Every one knew the young man was innocent, the magistrate knew it, the people knew it, but not a voice was raised in his behalf. No one would deprive him of the honour of carrying out, to the fullest extent, the teaching of his great master. He died and his father was free. Nowhere but in China could such a scene be witnessed. One result would undoubtedly follow, the magistrate would be promoted, because it could only be owing to his virtue that there was such an excellent young man in the district.

On the subject of spirits, as on all matters relating to heavenly things, Confucius seems rather inconsistent. His mind was wrapped up in the things of this earth, and he looked upon all such subjects as obscure and unprofitable. 'Spirits are to be respected,' he said, 'but to be kept at a distance.' Yet we are told 'he sacrificed to the dead, as though they were present, and to the spirits as though they were before him.'

But we must draw this short sketch of Confucius and his teaching to a close. Every student of Confucius must hold his personal character in high estimation. The narrative of few men's lives would be so free from vice, and so full of that which must be commended as right and good. But while we are forced to confess that there is very much to be admired in the Confucian system, especially compared with other idolatrous religions, we must not forget that there are many serious defects. One writer has summed them up as follows:—

"No relation to a living God is recognised. It knows no mediator between God and man. It is devoid of any deep insight into sin or moral evil. Truthfulness is not urged, but rather the reverse. Polygamy is presupposed and tolerated. Polytheism is sanctioned. Fortune telling, choosing of days, etc., are believed in. Filial piety is exaggerated into the deification of parents. All rewards are expected in this life. No comfort is offered to ordinary mortals either in this life or the next."

Certainly we can only say of the Confucianists of to-day as St. Paul said of some in old time, "Having no hope and without God in the world."

## DISCUSSION.

The CHAIRMAN.—We are very deeply indebted to the lecturer for this very instructive and delightful paper. In the present day there has been started what has been regarded as another subject of study, entitled that of comparative religion. I do not think that we who hold to the Christian faith need in the slightest degree be concerned with such a study as that. The paper has given to us some little insight into Confucianism, which will enable us to see its manifold defects; defects which are supplied by that system of faith which it is our privilege and blessing to hold. One cannot help being struck, however, with the excellent philosophical principles which appear in the teaching of Confucius here and there. Philosophy, of course, is an extremely valuable subject for the training and cultivation of the mind of man in every age and under all kinds of circumstances; but it is evident, from the experiences of the Chinese nation, that it is not such a study as enables the human understanding to progress to the extent which it needs progress. The stagnation of the Chinese nation, I think, can be understood better now that we have such a paper before us, telling us what their study has been, and how their minds have been contracted into the narrow channels of the thoughts of Confucius. As the paper has so very well remarked, it leaves man in a condition of serious want and makes no provision for the supply of that want. The man who is a bad man appears to have little or no hope held out to him by the Confucian system of philosophy or religion, in whichever way we may think it should be regarded. That which is so serious a defect in the Chinese philosophy and religion is only supplied adequately by the Christian faith. I was very glad to hear from the reader of the paper of the position which Christianity is now occupying in that great and important nation. We shall doubtless hear more of the Chinese nation in years to come than we have in the past. The Yellow Peril is one that we need not concern ourselves greatly about, but if there is one way by which the Yellow Peril may be avoided more than another, it is by the circulation of that truth which their present system of thought and life so earnestly claims

from us, and which is so wanting in their present faith and education.

The subject is now open for discussion.

Professor ORCHARD.—I am sure we owe our gratitude to the able and learned author of this paper for putting before us in so interesting a manner the character and teaching of one of the most remarkable ethical reformers and philosophers who ever trod the earth. Confucianism does not make good its claim to be a religion. A religion, as its derivation implies, is the re-binding of the human spirit to the great I AM. It is the restored relationship of man to God. The original fellowship has been lost by sin. If a man is to be restored to fellowship with God, that sin must be done away with. The great problem of any true religion is this, how to do away with sin. True religion is religion "before God and the Father," but Confucianism makes no remedy for sin. It enjoins some virtues, but it never rises higher than filial piety. If you do not rise higher than filial piety you do not raise man above his natural level. You do not restore the lost communion and fellowship with God.

Confucianism then does not deserve to be called a religion. It is not a religion. It is a system of philosophy undoubtedly, and we may concede this, I think fairly, to Confucius that he was a great ethical reformer and philosopher. At the bottom of page 57 and the beginning of page 58, Confucius himself admits the failure of his system. He admits that his system does not (even in his own case) soar far above the ordinary man of his days. He admits that his system does not free from anxieties, nor free from perplexities, nor free from fear. He admits further there are four things which he ought to do, but which his system does not enable him to do, namely, "To serve my father as I would require my son to serve me; To serve my prince as I would require my minister to serve me; To serve my elder brother as I would require my younger brother to serve me; To behave to my friend as I would require him to behave to me." He admits then that with regard to the relationships of father, subject, brother and friend, his system is a failure,—a failure in his own case, yet he was head and shoulders above most of his contemporaries.

There are one or two questions that I would like to ask the author of this paper. One is on page 47. It appears that before



Confucius had any food he offered a little of it up in sacrifice. Was this in sacrifice to the ancestors, or to the spirits, or to God ? Another question is on page 50, where it appears that if a little baby had even one tooth it was supposed to have a soul. I should be very glad to have some explanation of the supposed connection of tooth and soul, if the lecturer will kindly favour us with the supposed connection. And the third question I wish to ask is how he accounts for it that Confucianism has attained such a wonderful influence in China.

Lieut.-Colonel ALVES.—I should like to say just a word. A good many people are talking now-a-days of the numberless good religions in the world, as they call them, of which Christianity may be a little better than some others, but that they are all very much alike. I think there is a marvellous amount of sound Old Testament moral precepts of the Mosaic law in Confucianism. Mr. Elwin's friend must have sorely repented himself of that boy who was going to be drowned. According to the Mosaic ordinances, if a woman have a rebellious son, who will not obey the voice of his father, or that of his mother, they were to bring him before the elders for sentence of death. I think it would be a very good thing if that law were in existence at the present time.

There are many other points which seem to be very sound.

We remember how five and forty years ago, when Speke and Grant went to discover the source of the Nile, they struck across equatorial Africa, on to the lakes, and went down the Nile ; and if we also go to the head and work down we find in the Bible in very early days what may be called Mosaic-Levitical ordinances long before the time of Abraham. We find clean beasts in the ark, and not long after Abraham's time we see that people, when they went to meet with God, had to be clean and wash their clothes. If Levitical ordinances, which after all were only very secondary, should have been thus revealed, it was surely more important that the moral ordinances of the law should have been given as the common property of the whole world. It is not unreasonable to suppose that China should have possessed many of these ; and that Confucius, who admits not to have been original, but only a compiler of what was good, should have got hold of some of these ordinances. But even Israel was in a state of legality, keeping the law being a condition of life. It was a question of moral

ordinances, and that a man might not turn away from his righteousness that he had done and die in his sin. That is not the hope of the Christian and the teaching of the Apostle Paul. We remember that his remark concerning the heathen is that God deals with those who were desirous of doing right differently from those who have means of knowing the truth. Pre-Mosaic Revelation will account for all the wonderful truth that Confucius put into his system. We see in the Old Testament the marvellous authority that a parent had over his children, something that we do not dream of now-a-days. When Jephthah had made his rash vow, note his daughter's words. They were the words of a woman who was loyal to the truth and who made light of her own sacrifice, because her father had made his vow to Heaven. The Rechabites also in the days of Jeremiah were bound by an old vow of Jehonadab, son of Rechab, that they were not to drink wine or to live in houses. They obeyed the command of their father, although the prophet of the Lord put wine before them to drink; and they were commended for it. Filial respect and obedience are strongly enjoined in the Old Testament; and there must have been a good deal of moral doctrine floating about, some of which no doubt had got into China, which was a country not so sealed up in those days as it is now, 2,500 years later. It has had 2,500 years of training to make it more conservative than in those earlier days.

We are indebted to the reader of this paper, for he has given us a great insight into the general teaching of Confucius.

MR. ROUSE.—Is not the ascription to Almighty God, which is quoted by Mr. Elwin, the only one to be found in all the works of Confucius, except that in his *Book of History*, he alludes to Him at times as Shang-Ti, the Supreme Ruler. Believing this to be the fact, I should judge that Confucius knew little of God as a Father, or of a way in which guilty sinners could be reconciled to Him here below and find in Him thereafter a comforter and guide. Confucius instilled principles of justice, patience, and temperance, and a spirit of wise reflection into his disciples, and both privately and publicly during his brief sway as a ruler he illustrated that spirit, and those principles in his own person; but his philanthropy stopped short at the negative maxim, "*Do not do to others what you would not have them do to you*": he rose not to the sublime principles of the Sermon on the Mount, which was also, as the

Divine Saviour tells us, the underlying one of "the law and the prophets." All things whatsoever ye *would* that men should do to you, *do* ye even so to them.

But such knowledge of God as the Chinese sage possessed there is no proof that he thought out for himself without the help of any current belief or tradition; while there is strong reason, on the other hand, to infer that at one time the Chinese at large worshipped the Creator, and Him alone. The further we go back into the history of heathen nations, the more prevalent do we find the acknowledgment of, and reverence for one great Supreme Maker of all things. Thus in Babylonia we find in the time of King Khammurabi, contemporary of Abraham (as Hommel has shown), that although the state religion was a pagan idolatry, a very large number of personal names ended with the word *ilu*, God, and contained ascriptions to God of power, wisdom or kindness; while very few are to be met with at that time in which the name of a heathen god is imbedded: but, as the centuries advanced, personal names, formed from those of heathen divinities, wholly displaced the names that set forth the nobler tradition. In like manner (as Hommel further points out) in Arabia the earliest inscriptions of the Minaean kings, and the inscriptions that succeed them through several centuries, show an abundance of personal names ending with *ili*, God, and ascribing mighty or gracious conduct to Him; but gradually the names of pagan deities worked their way into the personal names of Arabia—Minaean and Sabaeen—until at length they ousted the truly Godfearing names of old.\*

So, too, as to Persia, a step nearer to China, if Zoroaster, the reputed founder of the Parsee monotheistic faith, really lived at so remote a period, as Clodd for instance assigns to him—namely, before the twelfth century B.C.—there is no special reason for supposing that he evolved that faith after he and all his countrymen had been used to a primeval worship of nature gods. Rather, in the absence of evidence, and with the analogy of contiguous

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\* It seems as if in their progressive rebellion against the true God, the last thing that men dared to do was to withdraw their children from His protection and put them under the protection of their fancied deities.—M. L. R.

Babylonia and Arabia before us, should we infer that Zoroaster preserved and restored the faith which had been transmitted from the time of the Deluge and of the great Dispersion which followed it, but which had already been abandoned by many of his countrymen for a worship of "the creature instead of the Creator," for the mighty forces that He directs, instead of the Spirit that made and controls them all.

Returning now to China, on the one hand, we find a strong link of communication between Babylonia and China at a remote epoch; on the other hand, we find a rare but periodical worship of the God of Heaven, celebrated from time immemorial by the Chinese emperors themselves. The link is known from the discovery made about twenty years ago, that a striking resemblance exists between some of the earliest Chinese characters and certain of the Babylonian ones—a discovery that I for one had the pleasure of seeing set forth by Professor Lacouperie to the Philological Society in about the year 1890, when he laid fifty cuneiform letters beside fifty of the phonetic letters in use in the chief province of China before the Chinese writing was made ideographic, showing the groups to be practically identical letter for letter. The worship is that which is paid once in the year by the emperor alone in the great Temple of Heaven, which is a vast inclosure at Pekin with a large altar in the midst, but no roof save the blue sky.

It is on record that seventy years ago, when a drought and famine had long been continued, the reigning emperor uttered before that altar a remarkable prayer, in which he confessed to the Supreme Ruler his sins and those of his nation, and asked forgiveness and a return of favour; and the very next day a most abundant rain fell upon the parched region and revived its fertility. "Them that honour me I will honour, saith the LORD."

Rev. Mr. ELWIN in reply said:—Some interesting points have been raised. With regard to the offering of a little food in sacrifice with grave, respectful air, that is specially mentioned in the *Annals of Confucius*, but it does not say to whom the offering was made. We may almost take it that it was to the spirits of the ancestors. And then, with regard to the teeth, that was a very interesting question, because if the soul comes with the teeth, we may almost suppose that the soul goes with the teeth, too! I have asked the Chinese about this, and all they can say is that that tradition has

been handed down from old time. The idea has, I believe, originated in order to make infanticide all the easier. If they can persuade themselves that the baby has no soul, then there is no difficulty in putting it into a pail of water like a kitten or a puppy. Of course, if it had a soul there would be greater difficulty, and perhaps the Chinaman would feel his conscience prick him a little. The question with regard to the influence of Confucianism is also very interesting. I think myself, it is owing to his books. The books are very old and the competitive examinations are dated back from about the year 631. The nation is so saturated with this Confucian idea, the books have to be learnt absolutely perfectly without a mistake; and any scholar in China who goes in for examination would be able to repeat the nine books right through, and of course that in itself would tend to give the whole Confucian system a standing in the country which nothing else would.

Dr. Legge held that Shang-ti was the Supreme God, that is to say, the God that we worship; the God that has been handed down, but of course there are others who will not allow that. I have spoken to Chinese scholars in China—English Chinese scholars—who would not allow that Shang-ti was the Supreme God; but it is a very wide question and certainly a very difficult question. Dr. Legge, when he visited the Temple of Shang-ti, where the sacrifice is offered only once a year by the emperor to God,—he worships in the middle of the night, and offers a whole bullock; it is in the open air; there is no temple. There is simply a mound and at the top of the mound an altar, and on this altar the sacrifice; and the only worshipper is the emperor. Dr. Legge, when he visited that place, was so convinced that in that particular spot worship to the true God had been handed down from century to century, that he stooped down and took off his boots, and he walked without his boots, because he said, "This is holy ground."

The Meeting adjourned.

## COMMUNICATIONS.

Rev. F. STORRS TURNER, B.A., writes :—

Mr. Elwin has crowded within his brief sketch of Confucius as much accurate and valuable information as could be got within the limit ; but I would point out that if he had been able to prepare for it by a description of the historical background the biography would have been more vivid, and our impression of the man much increased. It is difficult for an Englishman rightly to appreciate Confucius. His reverence for antiquity is offensive to our belief in progress ; his rigid scrupulosity in matters of court etiquette, social usage, and religious ritual, seems to us pharisaical ; and his remarkable reticence in respect to the great realities of religion has caused him to be suspected of agnosticism. But to understand Confucius one must study the history of his world. The first thing we shall learn is that his world was not our world. For him and for his people during two thousand years before, our world did not exist. Egypt, Assyria, Babylon, Persia, Greece, Rome, were utterly unknown. Three or four thousand miles of mountainous countries like Tibet, of waterless deserts like Gobi, and of vast uncultivated steppes, over which roamed nomad tribes of savage warriors, Huns, Scythians, Tartars, Mongols, divided Eastern Asia from Western Asia, as effectually as the Atlantic hid America from Europe. Confucius did not know the name "China," the place he knew was "all under heaven," *i.e.*, the world. This being so, those ancient books which he possessed were the only Bible he had ; and it was impossible for him to conceive of any other literature, any other civilisation, any other religion, than those of the "black-haired race." Moreover, the history he knew began with the tradition of an age of righteousness and peace, when saintly kings ruled ; whereas he lived in an age of general misrule, war, oppression and misery. The annals which we can read are full of battles and sieges. In the courts, assassinations, conspiracies, revolutions, were the rule rather than the exception. Fathers killed their sons and sons their fathers. Lust and incest polluted the palaces. It seemed as if morals and religion were dying. In such a time was Confucius sent into the world, as

he believed, to stem the flood of wickedness, and to restore the good old days of peace.

Seen against the darkness of this background, the life of Confucius is bright with noble heroism, steadfast purpose, clear-sighted wisdom, and, it seems to me, a profound religious faith. He did not teach theology, for he had none to teach; but he openly professed that his message was from heaven; and his loyal fulfilment of his mission, in self-sacrifice, poverty and reproach, is the evidence of the sincerity of his belief. And what was his message? In essence it was just this: "Be good. Heaven has made you capable of being good. Be good sons and good fathers, good husbands and good wives, good kings and good servants of your kings; brothers be good, friends be good." It was the simplest message, but mighty in its appeal to conscience as the divinely-given nature. For the sake of this we may well tolerate what seems to us an excessive devotion to forms and ceremonies. Confucius did not think it excessive. In the *Book of Rites*, it is said—

(1) Of all the methods for the good ordering of men, there is none more urgent than the use of ceremonies. Ceremonies are of five kinds, and there is none of them more important than sacrifice. Sacrifice is not a thing coming to a man from without, it issues from within him, and has its birth in his heart. When the heart is deeply moved expression is given to it by ceremonies. . . .

(2) The sacrifices of such men have their own blessing; not indeed what the world calls blessing. Blessing here means perfection; it is the name given to the complete and natural discharge of all duties.

The quotation from the "Filial Piety Classic" is apparently decisive against me; but this document is not one of the Four Books, and its authority therefore is not quite the highest. Again, the translation is open to question. In his version, Dr. Legge does not use the word "equal," but instead says "correlate."\* Kang-hi's great dictionary supports Legge; it does not explain the character as meaning equal, but as "pair," "couple," "opposite." The members of a pair or couplet may be equal or unequal. For instance, the dictionary gives "husband and wife" as an illustration,

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\* *Religions*, p. 79.

and to the Chinese mind husband and wife are by no means equal. I should have thought Legge's translation beyond question the correct one, had I not happened upon a Chinese commentator who clearly approves the other explanation. It is possible that the original meaning was that Duke Chan "associated" the worship of his father and King Wan with God, by worshipping them at the same time and with the same or similar sacrifices, and that afterwards this practice introduced the notion of equality of the beings worshipped. At any rate it seems to me that too much stress must not be laid upon one text. In one of the Psalms it is said, "I said ye are gods," and the meaning is not easily explained; but I think no one would assert that all the Israelites, or all their nobles and judges, were said to be "gods" in the sense of equality with Jehovah. For the interpretation of Confucius I rely upon the general tenour of his teaching. But during more than two thousand years, and among many millions of scholars, no doubt there have been many different interpretations of that teaching among the Chinese; and it is not surprising that foreign students differ in opinion.



ORDINARY GENERAL MEETING.

WAS HELD IN THE ROOMS OF THE INSTITUTE ON  
MONDAY, JANUARY 16TH, 1905.

GENERAL HALLIDAY IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following candidates were elected :—

LIFE ASSOCIATE :—Rev. Oswald J. Hogarth, M.A., Rondebosch, S. Africa.

ASSOCIATES :—Rev. Joseph Lampe, D.D., Professor, Presbyterian Theological College, Omaha, U.S.A. ; H. Neville Harris, Esq., India Civil Service (retired) ; Rev. D. Årnström, Aneby, Sweden.

The following paper was then read by the author :—

*THE RAJPUTS AND THE HISTORY OF RAJPUTANA.*  
By Colonel T. HOLBEIN HENDLEY, C.I.E., Indian Medical Service (retired).

THE Rajputs have attracted so much interest in India, that no fewer than 177 separate works upon them and their country are included in the Bibliography which is attached to the *Medical Gazetteer* of Rajputana alone, yet even in some of our principal encyclopædias only portions of a column of print are directly devoted to the subject. The Rajputs, or sons of kings, and the land of Rajputana, or Rajasthan, as it is more classically termed, the chief seat of their power, cannot, therefore, be adequately studied in a single address, so that I propose, after giving some account of the people and of their country, to consider, as being more properly fitted for discussion by this Society, the causes which led to the establishment of a most interesting race, for more than a thousand years in the same region, during which period they flourished with little real disturbance by the paramount powers of India, which changed no fewer than at least seven times in the same millennium. Valuable lessons may be learned from the study of the history, customs, and peculiarities of such a noble, manly, and interesting

race, lessons which may serve to guide us into the true way of preserving empire, a way that can only be based on upright, just, and honourable, and hence, truly scientific, principles. It was the failure to recognize these principles which in time led to the downfall of the great Moghul empire, and also prevented the Mahrattas from establishing themselves upon its ruins.

It is unnecessary to dwell long on the remote origin of the Rajputs, who have been said either to be the direct descendants of the Kshatriya, or warrior caste of the earliest Indian writers, or to represent them as a mixed race, which took a name to which they had little title, or to refer to their alleged invasion of India at a much later period from Central Asia. It is sufficient to note that powerful rulers of this great tribe were established for a long period in early times in North India, who were gradually driven out from the plain country into the more inaccessible and less fruitful districts which are now known under the names of Rajputana, Malwa, and even Gujarat, in the first of which they have made their special home, and in which they have maintained themselves to this day.

Rajputana is in the north-west of India, and lies between the Punjab on the north, Sindh on the west, the united provinces of Agra and Oudh on the east, and Malwa and Gujarat on the south. Its area is nearly 133,000 square miles, or about 11,500 more than that of the British Isles.

The Aravalli mountains stretch diagonally across it from near Delhi down to the south-west border towards Gujarat, dividing it into two regions, of which that to the north-west, containing about three-fifths of the area, is generally sandy, ill-watered and unproductive, approaching even to desert as the west is reached, while that to the south-east, or two-fifths of the whole, has a fertile soil with forest tracts, and in the south is more or less covered with hills which are well-clothed with woods, both the latter tracts being well watered. Such is in brief the description of the country which is given by Colonel Abbott in his census report for 1891. The states of Marwar, Bikanir, and Jaisalmer, all Rajput, lie in the larger region; those of Meywar, with its offshoots, Dungarpur, Partabgarh, Banswara, and Sirohi are in the south, leaving the rest of the province for Jaipur, Alwar, Karauli, Kishengarh, and the Haraoti states of Bundi, Kotah, and Jhalawar, if we regard only the Rajputs to whom the country belonged for so many centuries; but we must add to complete the whole the two Jhat principalities of Bharatpur and Dholpur, part of the Mohammedan state of Tonk, and last, but not least, the British district of Ajmere, which lies

in the centre of the country, and was one of the principal residences and capitals of the Moghul Emperors.

As the physical conditions of a country, including the geology and meteorology, undoubtedly exercise a very important influence upon the inhabitants, whether it be on their history or their character, an influence which I believe to have been especially marked in the present case, a somewhat careful study of these points must be made.

Geologists inform us that the Aravalli mountains differ from the other great ranges of India in being entirely composed of disturbed rocks, with the axes of disturbance corresponding with the direction of the chain, the formations in them belonging to the Archæan rocks, and being of great antiquity and quite unfossiliferous. North-west of the mountains alluvial formations, also unfossiliferous, extend across part of Marwar; Vindhyan rocks, a similar series, being found on the south-east border of the province. Valuable points related to the geology are the kinds of building materials associated with the strata; the nature of the soils; and the influence of these factors on the climate, the communications, the animal and vegetable products, and the development, health and happiness of the people, as well as the effect they have had upon their relations with the outside world. In the eastern and central parts of Rajputana the soil is light, assimilating to that of the United Provinces, and it yields good crops of cereals. The rich loams of Haraoti and parts of Meywar supply large quantities of wheat, sugar-cane, cotton and opium; this district, under Zalim Singh, the famous regent of Kotah, having been a hundred years ago the granary of the centre of India. On the sand of the north and north-west one annual harvest, instead of two as elsewhere, is reaped and is chiefly made up of millets. There is, therefore, a great difference of foods depending upon the nature of the soil to a large extent; thus, for example, where the staple is millet the food is coarse, and this fact, added to the scarcity of good fodder, which is due to the irregular rainfall, makes life very hard in the desert tracts for both man and beast.

Yet this very difficulty has its compensations, because it compels the inhabitants who are strong and hardy to seek their fortunes abroad, thus following the law of movement so forcibly enunciated by Buckle.

These remarks are not only true of the Rajput warrior, but of the mercantile classes, who under the names of Marwaris, Baniyas, Seths, or bankers, reside for a time in the rich towns and villages of the whole of North India, and even far beyond,

in these days of safety, in such places as Hongkong or Zanzibar; and also of Brahmans, who go to distant parts to act as priests to the scattered members of the desert clans; and unfortunately also of highway robbers, or dakaits who used to make raids far and wide in India, returning to their homes with their spoil.

All alike however hope to die in the Rajput land, and to bring up their families in it so that the strength and independence of the race may be kept up.

In most parts of the country stone is available for building substantial houses, but in others, where the soil is clayey and wood is cheap, tiles and bricks are in general use, and in the hills wattle and mud walls with grass roofs are common. The Rajput was therefore always comfortably housed, but the abundant quantity of marble and beautiful sandstones of different colours in some districts rendered it possible for the chiefs to construct most charming palaces, handsome temples, and, what was much more useful to them, strong forts and town walls. Few minerals except salt have been worked, but even this and the ornamental building stone, although they added to the wealth of the people, have not been regarded as unmixed blessings, because they attracted the covetous eyes of the Moghuls.

The geographical and geological features of Rajputana are most important factors in determining its meteorology. A large portion of the north-west is occupied by the great Indian desert, which is covered with sand hills shaped in long straight ridges, and is ill-watered. The south-east of the Aravallis is more elevated and fertile. It is very diversified, and contains extensive hill ranges, valleys, plateaux, and woodlands. It is traversed by several large rivers, and there are numerous isolated rocky eminences. Sir John Eliot, who kindly wrote a description of the meteorology for my *Rajputana Medical Gazetteer*, observes that the meteorological features of the two divisions of Rajputana differ greatly, depending partly upon its physical configuration and on its proximity to the Arabian Sea to the west, and to the great river plains of Northern India to the east. There are two seasons, viz., the south-west or wet, and the north-east or dry. The former lasts from about June to September, and gives on an average about 13·47 inches of rain to North-west Rajputana, and 25·32 inches to the south-east. Much of the rain comes from the Bombay current in moderate showers, but in some years a good deal is received during the passage of cyclonic storms from the west. October and November are usually fine and dry, though there

are occasional cyclonic storms, and here I may mention, in passing, that this is the time at which the warlike races began their military expeditions. The north-east monsoon Sir J. Eliot divides into a cold weather season from December to February, and a hot season from March to May or June, when the rains begin. The diurnal range of temperature in the former is very large, and there are usually storms which pass from the north-east towards the Gangetic plain, and are followed by a remarkably bright and clear state of the atmosphere. They are sometimes accompanied by hail. In the hot season, hot winds blow over the greater part of Rajputana, and the relative humidity is very low, being sometimes as little as 2 or 3 per cent. Excessive dryness of the air, high temperature, with large diurnal ranges, and hot, dry, westerly winds are the chief normal features of this period. The total yearly rainfall for the north-west is 15·26 inches, and for the south-east 27·19 inches. The daily range of temperature is sometimes between 25° to 32°, and very high temperatures are noted, in the end of May for example being as much as 123° F. On the other hand, the thermometer falls in the cold weather as low as 30°.

The climate is a very prominent factor in the making of the Rajput, and in preserving his health. The cold months are usually very delightful, and the bracing air is most invigorating; the hot season, on account of the dryness of the atmosphere and the frequent winds, can generally be well borne, and the monsoon period affords a welcome relief to both man and beast. On the whole the public health is good. Dust and glare account for a great prevalence of eye affections, and there is much malarial fever, strangely to say in the dry city of Bikanir being more prevalent than in the more moist districts of the east of the province, and so much so is this the case in certain years that in the west it has been sometimes difficult to gather in the autumnal harvest, and military operations would under such circumstances be long delayed. On the other hand, although smallpox and cholera are common enough, they do not spread so widely as in other parts of the empire, on account of the free movement of air, its dryness, and the fine open country round the hills. The climate, especially of the north-western tracts, is indeed very favourable to the growth of a hardy, manly population, and the comparatively long cold season recuperates the forces of all but the most feeble, thus, notwithstanding many untoward conditions, the Rajputs, and even the peasantry of other tribes,

have through many centuries been noted for their bodily strength and for those qualities of mind which should accompany such a state of health. Where they have failed it has been due to want of union and good leaders and to incapacity to adapt themselves to modern conditions, which their more quick-witted adversaries, under foreign influences, have not been slow to understand and follow. The fact that Rajputana is one of our best recruiting grounds proves that the material is still one of the best, and, if properly led, second to none in India. Most unfortunately the Rajput despises the pen, though he feels and recognises its power, which has often been exercised to his detriment; but, where physical force, bravery, and loyalty alone are required, he is always to be depended upon, though he cannot easily realise that personal courage, with faithful devotion to his liege lord, are not sufficient to ensure Imperial rule in these days, in which strategy and well considered plans must accompany discipline, and when force alone cannot rule the world. Many of my Rajput friends, who despise the learning of the scholar and the schools, which they associate to some extent with trickery and with the possession of additional fangs to enable a man to prey upon others, have bitterly regretted to me their powerlessness to prove their loyalty by using their swords on behalf of the paramount sovereign. It may be that this noble, if somewhat mediæval, spirit may yet some day be used for the good of the empire. The Pax Britannica has, however, already converted the Meenas and the Jhats, the strongest of the peasantry, as well as many Rajputs, into ordinary citizens, who seem to have forgotten the arts of war, though as yet, I fear, they have not sufficiently so learned the arts of peace as to be able to defeat the pleader, or astute petty lawyer, to whom all of them are ready to fall a prey, or the *baniya* or small trader, from whom they recklessly borrow, so that in many cases they lose to the one or to the other their lands and fortunes.

I think that I have shown that to some extent the progress, ancient success, and present position of the Rajputs and their sovereignties, have been due to the geographical, physical, and climatic conditions of their country. I shall now therefore deal with other important considerations. I repeat that the fact that the same race has remained dominant, in what would appear at first sight an unsatisfactory and unpropitious country and environment, from the date of its first appearance there fifteen hundred years ago, points to conditions which are indeed worthy of the most careful study. Assuming that the ancestors

of the Rajputs came, as tradition asserts they did, from beyond the Himalayas, and then spread out on the easily conquerable plains of the north of India, from which they were themselves in turn evacuated by more disciplined conquerors, and that the best of them then retired to lands which were better suited to their martial instincts and modes of life, where finally they fully established themselves, we may go on to ask why Rajputana fulfilled the conditions which were necessary. The Rajputs were brave, hardy, and above all extremely desirous of possessing land which they could hold without being under the strict direct rule of a supreme court. They were fond of the chase, in which they could maintain their strength and learn the arts of stratagem in peace, which, in early ages, were much the same as in war; while at the same time they did not lessen their devotion to their tribal chiefs, whom they regarded as the patriarchal heads of their families, whose interests were similar to their own, whom they were always willing to acknowledge and die for as the first amongst equals, the preservation of whose rights was the same thing as preserving their own, but whom under ordinary conditions it was wiser to keep at a distance. A country studded with mountain ranges and isolated hills, at the feet of which were many fertile valleys and plains, admirably met all these and many other wants of such a people, not only because it became easy to construct forts from which the plains could be dominated, but on account of the alternations of wood and cultivation, and the mountain streams which furnished excellent cover and food for game. Moreover, the extended cold season renewed the vigour of the men and kept up their full powers, which enabled them, in days when standing armies, and particularly infantry, were of little value, but when personal courage counted for so much, not only to hold their own, but to extend their possessions, or at least to provide for their sons. It was not the aim, as it was not the genius of the Rajput, to promote commerce, though there are instances of great wealth having been obtained under their protection in the more settled districts, as is evidenced by the riches of the banker and merchants, especially of the Jain sect, which enabled them to build such famous shrines as those of Abu and Sadri, and to erect splendid mansions in such out-of-the-way places as Bikanir, Jodhpore and Shekhawati, or huge temples at Mathura and elsewhere. The usual position and history of a Rajput capital, or of the home of any Rajput Thakur or noble, points to the truth of my conclusions. Let us take for example the capitals

of any of the modern states. The chiefs of Meywar, when they were driven from the plains of Gujarat, settled in the innermost recesses of the Aravalli mountains; they then conquered the Mori chief of Cheetore, and for a thousand years his fortress remained their capital, from which, when they were opposed to the disciplined hosts of the Moghul Empire, they had, after a very hard struggle, extending over many years, to withdraw again into the rugged district in which they founded the new and present capital of Udaipur, the City of the Rising Sun. So also at Jeypore the earliest capitals were Kho and Kuntalgarh, in almost inaccessible hills, then at Amber, still in the hills, and finally at Jeypore in the plains, but even now under the shadow of the mountain range, which is crowned with forts for the protection of the city. Again, the capital of Marwar, when it first became an important state, was at Mundore in the hills, and it was then removed, more space being required, to the plains beyond, though it was there also dominated by a noble fort high up on a grand scarped rock. Without exception the Rajput chiefs, even if their present capital does not stand in the hills, have some inaccessible fastness to which they can retire, as well as some game preserve in the hills close by. The homes of the nobles are similarly situated, and if there are no mountains there are wide extents of sand which serve a similar purpose, or, as at Kotah, a broad river which admits of easy defence of the place. Of course in process of time it became no longer so easy to provide for those who separated from the parent stem, so that they had to be satisfied with less typical sites, but the traveller will be surprised to find in Rajputana how few are the villages of the nobles which have not close by some stronghold, which is built on a rock or near some low hills, or some woodland out of which to make a game preserve. Villages in the open owned for their lord him who had the longest arm, and when the inhabitants were in danger or were oppressed they withdrew to his fort for shelter.

Tod refers to seeing near Reah in Marwar the cenotaph of the Thakur of that place, who fell in 1749 in defending the town walls against the Mhairs, having first put to death his wife in order to save his honour, and he adds that "there was scarcely a family on either side of the Aravallis whose estates lay near them which had not cenotaphs bearing similar inscriptions, recording the desperate raids of the mountaineers; and it may be asserted that one of the greatest benefits we conferred on Rajputana was the conversion of the numerous banditti . . . into peaceful tax-paying subjects. We have now, moreover,



metamorphosised several corps of them, from breakers, into keepers of the peace." The work of building strong forts and town walls was much facilitated by the abundance of excellent building materials. In North India, below the Himalayas, Rajputana alone fulfilled the important conditions which I have named. These are found, however, in other parts of the Peninsula, and in such situations the Rajputs, or the people who resembled them, also established themselves; thus, for example, in the neighbourhood of Rotasgarh, on the Soane river in Bengal, and in the adjoining hill states of Chota Nagpur, there are many petty chiefs, who assert their descent from the genuine Rajput stock, though it is no doubt very much diluted by admixture with inferior aboriginal blood. The great Mahratta Chief, Sivaji, and the Rulers of Nepal also claim Rajput origin, and that from the noblest stock, none other than the royal house of Udaipur. The rule is almost universal, though it is true that in early times, when they became paramount, the great chiefs of India, from whom the present rulers believe they are descended; even the deified king Rama himself; and the lords of Balabhi and Kanauj, respectively the reputed ancestors of the chiefs of Jaipur, Udaipur and Marwar, lived in the plains, but they did not thoroughly establish themselves there. Thanks to their possession of Chitor, the famous rock fortress, and of the hill countries near it, the chiefs of Meywar after Rana Hamir were paramount for more than two hundred years in Rajputana, notwithstanding that they had against them the power of the great sovereigns of Delhi.

I will now quote at length from one of the appendices to the famous *Rajasthan*, or "*History of the Rajputs*," a remonstrance which was addressed to Colonel James Tod, its author, when he was Political Agent in Meywar, by the Sub-vassals of Deogarh, because it is most typical of the ideas of the Rajputs as regards their duties to their liege lord, and still more so of his obligations to them, and then I propose to give some illustrations of the peculiar qualities of the race, qualities both good and bad, to which, in my opinion, they owe not only their successes, but their failures.

Remonstrance of the Sub-vassals of Deogarh against their chief, Rawat Gokal Singh. (Appendix, Tod's *Rajasthan*.)

1. He respects not the privileges or customs established of old.
2. To each Rajput's house a *Charsa* or hide of land was attached; this he has resumed.
3. Whoever bribes him is a true man, who does not is a thief.

4. Ten or twelve villages established by his vassals he has resumed and left their families to starve.

5. From time immemorial sanctuary has been esteemed sacred ; this he has abolished.

6. On emergencies he would pledge his oath to his subjects, and afterwards plunder them.

7. In old times, it was customary when the presence of his chiefs and kindred was required, to invite them by letter ; a fine is now the warrant of summons, thus lessening their dignity.

8. Such messengers in former times had a *takka* (a copper coin) for their ration, now he imposes two rupees (64 times as much).

9. Formerly when robberies occurred in the mountains within the limits of Deogarh, the loss was made good ; now all complaint is useless, for his *faujdar* (military commander) receives a fourth of all such plunder. The Mers range at liberty ; but before they never committed murder, they slay as well as rob our kin, nor is there any redress, and such plunder is even sold within the town of Deogarh.

10. Without crime, he resumes the land of his vassals for the sake of imposition of fines, and after such are paid, he cuts down the green crops, with which he feeds his horses.

11. The cultivators on the lands of the vassals he seizes by force, extorts fines, or sells their cattle to pay them. Thus cultivation is ruined, and the inhabitants leave the country.

12. From oppression the town magistrates of Deogarh have fled to Ráipur. He lays in watch to seize and extort money from them.

13. When he summons his vassals for purposes of extortion and they escape his clutches, he seizes on their wives and families. Females, from a sense of honour, have on such occasions thrown themselves into wells.

14. He interferes to recover old debts, distraining the debtor of all he has in the world ; half he receives.

15. If any man have a good horse, by fair means or foul he contrives to get it.

16. When Deogarh was established, at the same time were our allotments ; as is his patrimony, so is our patrimony. Thousands of rupees have been expended in establishing them and improving them, yet our rank, privileges, and rights he equally disregards.

17. From these villages, founded by our forefathers, he at times will take four or five skins of land, and bestow them on

foreigners; and thus the ancient proprietors are reduced to poverty and ruin.

18. From of old all his Rajput kin had daily rations of grain; for four years these rights have been abolished.

19. From ancient times the vassals formed his council: now he consults only foreigners. What has been the consequence? The whole annual revenue derived from the mountains is lost.

20. From the ancient allotment of the brotherhood the mountaineers carry off the cattle, and instead of redeeming them, this *faujdar* (of lies) sets the plunderers up to the trick of demanding blackmail.

21. Money is justice and there is none other: whoever has money may be heard. The bankers and merchants have gone abroad for protection, but he asks not where they are.

22. Refers to their being fined when they attempt to do themselves justice, and recover their cattle when they have been driven to the hills, thereby leading to loss of dignity; to failure to investigate feuds, whereby the Rajput is obliged to abandon his patrimony, there being neither protection nor support.

They add that the chief is so supine and so regardless of honour, that he tells us to take money to the hills and redeem our property; foreigners are all in all, and the home-bred is set aside. Dekhanis (Southerners) and plunderers enjoy the lands of his brethren. Justice there is none.

Our rights and privileges in his family are the same as his in the family of the Presence (the Maharana). What crimes have we committed, that at this day we should lose our lands!

We are in great trouble.

The recital of the wrongs of those poor people seems like reproducing a page out of ancient Semitic history.

The courage of the Rajputs, whether it is considered under its personal or its tribal and collective aspects, during the period of their greatness, was undoubted. Where every page of their history seems full of instances of both kinds of courage it is difficult to quote special cases. The most powerful incentives to bravery amongst them are perhaps pride of race and devotion to the immediate tribal lord rather than love of country. The ordinary Rajput thinks it quite sufficient to introduce himself by saying, "I am a Rajput," the son of a king, and the proudest boast of his wife is to be the mother of a Rajput. Many a man of this race has been encouraged by his women to return again and again to fight the enemy and to perform the most heroic deeds. Even their taunts were not wanting, though these were rarely needed. The Emperor Akbar caused effigies to be put

up of Patta Singh and Jai Mal, one of them a mere lad of sixteen, who, both fell fighting on the slopes of Chitor, before his own palace, figures which are in existence to this day, as a testimony to his admiration for their valour.

We are told that the mother and bride of Patta Singh accompanied him, and that both fell fighting near the spot. I have myself seen the monument erected to his memory, and from the tower of Victory of Kumbhu Rana which crowns that noble hill of Chitor, have heard the representative of his name and honours speak with pride of his forefather's bravery and patriotism, both of which it was easy to see he would willingly emulate.

Where every local history teems with instances of personal courage of both sexes, and it is almost impossible to find a coward, it would be invidious to quote more examples, I shall, therefore, go on to the collective bravery of the race, which has been the subject of comment of all historians. When the Rajput finds his case hopeless, he assumes saffron coloured robes, and putting to death the females of all ages, rushes headlong into the ranks of the enemy, and committing terrible havoc, there finds the death which he seeks.

No fewer than three times was this awful sacrifice made in the history of Meywar, when, headed by the highest of the queens, the wives and daughters of all the nobles and the remaining females of the clan went down into the caverns on the side of the mountain, and there were suffocated or burned; for if this had not been done, they would have become the lawful prey of the captors, as was the case with the Jews of old and the nations with whom they fought.

In a beautiful valley cleft in the hill I was shown the sacred spot where is the entrance to the cavern in which the last and, perhaps, all of these fearful sacrifices took place. In front of it is a sacred fountain, and around it are grouped some small temples in which the manes of the dead are propitiated, and where the Rajputs pray for courage to imitate the example set by their illustrious ancestors, to which indeed they need but little incentive, the flames being abundantly fed by their bards and historians from their earliest days. Nor indeed are the women less backward than the men in all that is chivalrous. Taught from their infancy that pious wives should accompany their husbands to the realms of the dead, they arm their sons for battle, and follow their lords, in many cases, as the annals testify, most gladly, to the funeral pyre. Nor is this surprising, because the lot of a widow is by no means a pleasant one, as custom prescribes many hardships that she must go through if

she wishes to preserve her reputation for honour amongst her fellows. The sacrifice of the Johar was not confined to great national occasions, but was an accompaniment of even small intertribal conflicts. The whole story turns upon the Rajput's jealousy of his honour, a feeling of which the following extract from the memoirs of James Skinner affords a good illustration. Fraser, who writes his memoirs, says, "If we seek for a picture of chivalrous gallantry, unswerving fidelity, and fearless self-devotion, we have only to turn to the cavalry of the Rajput states; particularly to that of the Rahtores. We shall find there acts of resolute heroism that have not been surpassed by the troops of any age or country. In the history of their own wars we find repeated instances of bodies of their horsemen dashing against lines of spears and bayonets in the field, and against batteries bristling with cannon, regardless of the havoc in their own ranks made by grape and steel, while in defence of their fortresses we find them dying to the last man, rather than accept quarter from their assailants on any terms but such as they deem consistent with military honour, for it is the *Izzat*, the *Abru*, of the Rajput which is dearer to him than life, which instigates him to imperil that in its defence; while his devotion to his chief and clan, like that of the Highlanders of yore, makes all sacrifices easy when these are in peril." Skinner gives an instance of a small garhi or petty fort in the Doab which was threatened by a detachment of the British army. The thirteen Rajputs who held it agreed to surrender to Skinner if permitted to go free and carry off their arms; but when the younger officers told them to give them up (as Skinner had promised), they said it was against their custom. Unfortunately, in spite of Skinner's remonstrances, they were refused, and then turned back. They opposed the twenty men sent against them and killed or wounded as many in number as themselves, and finally all died in the little post, surrounded by three or four times the number of their assailants dying or dead around them. The famous La Borgne, or Count de Boigne, who was such a prominent and good specimen of the military adventurer, who was the means, thanks to his training of the infantry of the Mahrattas, of doing more harm to the Rajput cause than perhaps any one else, bears testimony to the gallantry of the Rahtore horse. At the renowned battle of Mairta they charged and recharged up to the very muzzles of the guns. Again and again they charged, each time with ebbing effort and weaker effect; again and again they flung themselves against that hedge of bayonets with merciless

madness. There is a limit to human endurance, but to-day that limit was death. So the ghastly sacrifice was consummated, until only fifteen remained alive, and these, steadfast to the end, returned for the last time to the shambles of self-immolation, and found the death they sought. Baber, who was the conqueror at Biana, owed that victory, which gave him India, to his artillery and to the treachery of some of the supporters of his valiant antagonist, Sanga Rana of Meywar, and perhaps to the want of general discipline of the foe, and not to any decay in their courage, for which he had the greatest admiration. All writers up to the end of the eighteenth century speak in similar terms, but when the new century dawned the incursions of the Mahrattas, aided as they were by internal dissensions of the Rajput princes, and strengthened by the infantry and artillery under the European adventurers, who had trained them, completely demoralised the race, so that Skinner, who saw "the brave Surajbanses, or the children of the Sun," in their prime in 1798, in 1832 says, "How much are they now fallen. Chiefs, no longer brave leaders, but either boys or men sunk in vice or debauchery, guided by women or Kāmdars or agents—Udaipur the only exception." Very shortly afterwards Dr. Irvine of Ajmere wrote of the courage of the Rajput as having been very much overrated, and as having been at all times due in a great measure to the use of opium and other stimulants, but their bravery was a matter of common knowledge long before opium was in use according to Tod, and was exercised under circumstances which were quite independent of such adventitious support. The Rajput takes a dose of opium before an engagement as an almost sacramental right and in part, as a valiant man of the race told me, for medical reasons.

Be that as it may, I think no one who knows the people would not be glad to lead such men in a charge, being certain that he would be followed to the death. The Rajput is impulsive, easily deceived by a wily foe, as the emperors knew well, having on several important occasions detached chiefs from the cause of their own enemies by the stratagem of allowing misleading, or forged, letters to fall into their hands. He is too prone to take offence and will fight with his brethren for land as well as for every insult, whether it is true or false, so unreflecting is he, but he is generous to the foe, often giving away advantages in a reckless fashion. He has no idea of discipline, but he will die for the most quixotic and trivial reasons in defence of his honour and of that of his immediate

lord, or for any cause which the latter takes up, though he does not so readily fight for country as we regard the word. Tod tells us how the Rajput regards the honour of the clan, or of his own family, as the most pressing of all duties.

Two illustrations will suffice to enforce the above remarks. The Maharana of Udaipur had the son of the great Moghul, Aurungzeb (Orme says it was the emperor himself) in his power in the mountains, as well as a favourite queen. Although their detention would have been of the utmost value to him, he let both go without making any terms. Two great nobles claimed the right of leading the van in war. The chief, not wishing to offend either of them, said that he who was first inside of a town which was then being besieged should lead in the future. One advanced to the wall, the other tried to enter by the gate, but the latter finding his elephant would not attempt to burst it in on account of the long spikes of iron with which it was studded, and stimulated into frenzy by the distant sound of the war cry of his rival, threw himself upon the sharp points and commanded his mahout, or elephant driver, to press forward through his body, but in the moment of death he had still the mortification of hearing that his antagonist was already within the walls.

It is a noble sight to see the Rajputs in full martial array on the open plain. Some faint idea of their splendour I witnessed thirty years ago when, after his father's death, the late Maharaja Jaswant Singh of Marwar, accompanied by the whole of his court and his nineteen brothers, went out of Jodhpur to escort the then Chief of Jaipur, Maharaja Ram Singh, into his capital. The young nobles were mounted on camels or horses decked with the gayest trappings, and with the tails of the wild ox fastened in front of their saddles. Elephants carried the royal standard and insignia of Mārwar, and before the chiefs and those who accompanied them ran crowds of horse and foot, while from all sides were heard the plaudits of the people, accompanied by the discharge of muskets and similar weapons and the booming of cannon from the fort walls. Such is the ceremony of the Peshwai or Istakbāl. Something of the ancient glories was seen at the famous Imperial Assemblage of Delhi, and a faint, though modernized, version of them in the same capital at the Coronation Darbar of 1903, when an unfortunate chief, who wore the national dress, the garb of the Moghul Court, as he ascended the Vice-regal dais, excited the mirth of the unthinking crowd.

Most terrible is the picture drawn for us of the condition

of Rajputana when the British first became intimately connected with it.

Broughton, in his letters from a Mahratta camp, describes how the army of Sindeah passed systematically over the lands of all the villages which did not buy him off. His troops deliberately traversed the fields of wheat and barley where the ear was just ripening, with no more remorse than if it had been a desert, the Mahrattas tearing up the corn and loading themselves and their cattle with it. Risalas (troops of cavalry) occasionally halted in the midst of a particularly flourishing spot to allow their horses to get a good feed. Even the beams and thatch of the houses were carried away. They tore and destroyed that which they did not want, so that it was no wonder that the peasantry were raised against them and cut off all they could. These miscreants, if they had a grudge against a village, would march over and trample down the growing crops. He laments the degeneracy of the Rajputs, who were formerly so eminently distinguished for their chivalrous courage and high sense of honour, which now seemed to have quite deserted them, and, as an instance of the spirit which formerly animated them, he mentions that when the Chief of Bhurtpore marched in defiance through the Jeypore country, the nobles rose up and with their followers drove him off with fearful loss. This writer, and many others at the time, refer to the manner in which the English abandoned the Rajputs under the most unfortunate and disastrous policy of the East India Company that was carried out by Sir George Barlow, at which time, for our own convenience, we abandoned this brave race, not only to the Mahrattas, but even to those still worse foes, the awful Pindaris, who are described as despotic marauders and savage barbarians, who were prowling about the country in immense hordes, being composed of the worst men of the Mahrattas and Musalman armies, and of all other scoundrels of the lowest class whom the civil wars and troubles of the period had driven to obtain a livelihood by preying upon their fellow creatures. These Pindaris, another writer says, ranged over the countries of Malwa and Rajputana as if they were their common prey. Miserable indeed was the condition of the land, not only from the ravages of these savages, but from the excesses of the no less ferocious chiefs and princes who disputed for power upon their soil, so that the greater portion of them was utterly ruined and depopulated; and the natives have given to that period (1800-1818) the expressive name of *gardi-ka-wakt*, that is, the time of trouble. "The poor Bhils,



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Tod refers to seeing near Reah in Marwar the cenotaph of the Thakur of that place, who fell in 1749 in defending the town walls against the Mhairs, having first put to death his wife in order to save his honour, and he adds that "there was scarcely a family on either side of the Aravallis whose estates lay near them which had not cenotaphs bearing similar inscriptions, recording the desperate raids of the mountaineers; and it may be asserted that one of the greatest benefits we conferred on Rajputana was the conversion of the numerous banditti . . . into peaceful tax-paying subjects. We have now, moreover,

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of any of the modern states. The chiefs of Meywar, when they were driven from the plains of Gujarat, settled in the innermost recesses of the Aravalli mountains; they then conquered the Mori chief of Cheetore, and for a thousand years his fortress remained their capital, from which, when they were opposed to the disciplined hosts of the Moghul Empire, they had, after a very hard struggle, extending over many years, to withdraw again into the rugged district in which they founded the new and present capital of Udaipur, the City of the Rising Sun. So also at Jeypore the earliest capitals were Kho and Kuntalgarh, in almost inaccessible hills, then at Amber, still in the hills, and finally at Jeypore in the plains, but even now under the shadow of the mountain range, which is crowned with forts for the protection of the city. Again, the capital of Marwar, when it first became an important state, was at Mundore in the hills, and it was then removed, more space being required, to the plains beyond, though it was there also dominated by a noble fort high up on a grand scarped rock. Without exception the Rajput chiefs, even if their present capital does not stand in the hills, have some inaccessible fastness to which they can retire, as well as some game preserve in the hills close by. The homes of the nobles are similarly situated, and if there are no mountains there are wide extents of sand which serve a similar purpose, or, as at Kotah, a broad river which admits of easy defence of the place. Of course in process of time it became no longer so easy to provide for those who separated from the parent stem, so that they had to be satisfied with less typical sites, but the traveller will be surprised to find in Rajputana how few are the villages of the nobles which have not close by some stronghold, which is built on a rock or near some low hills, or some woodland out of which to make a game preserve. Villages in the open owned for their lord him who had the longest arm, and when the inhabitants were in danger or were oppressed they withdrew to his fort for shelter.

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a more splendid view than that of the wide plain of Jaipur, as seen upon the road from Amber, with its noble city in the distance, and the foreground studded with palaces, shrines, temples, tanks, and multitudes of villages thick with groves and gardens. There are few places in Upper India better worth seeing than these two cities and their environs." Tod describes the glories of Jodhpur, "within whose noble fort, situated high up on a mole projecting from a low range of hills so as to be almost isolated, surrounded by strong walls with numerous lofty towers, are many splendid edifices and the Raja's residence, composed of many palaces which were constructed by his ancestors."

Of Bundi he says, "The *coup-d'œil* of the castellated palace of Bundi, from whichever side you approach it, is perhaps the most striking in India; . . . throughout Rajwarra, which boasts many fine palaces, the Bundica Mahl is allowed to possess the first rank; for which it is indebted to situation not less than to the splendid additions which it has continually received."

The valley of Udaipur he thought the "most diversified and most romantic spot on the continent of India," and who is there who has seen its marvellous palaces, both on the waters of the Peshola Lake and on its beautiful shores, its temples and its Mahasati, or abodes of the dead, its wood-clad embracing hills, its wayside shrines, and its interesting inhabitants, who shall differ from him?

The Jain Temple of Vrishabdeva at Mount Abu, is, according to him, "Beyond controversy the most superb of all the temples of India, and there is not an edifice besides the Taj Mahl which can approach it. The pen is incompetent to describe the exuberant beauties of this proud monument of the Jains, raised by one of the richest of their votaries (by whose name, and not that of the pontiff enshrined within, it is still designated), and which continues to attract pilgrims from every region of India."

Time would indeed fail us if we were to tell of all the glories of this romantic land, but I would mention that it is not only the princes who have such beautiful homes, but in Bikanir, Jaisalmer, and Ajmere, and many another spot there are similar palatial residences of bankers, priests, and other rich men, most of these towns being adorned with buildings which are carved from top to bottom of their walls with most intricate lace work in red sandstone and marble. Moreover every picturesque rock in some parts of the country seems to be the

site of some charming little shrine, and every hill is crowned with some romantic castle, all such buildings giving the lie to the idea that the Hindu does not love beauty, and, in choosing the situations of his buildings, that he is only moved by considerations of comfort or perhaps of coolness or security. Some of the views which are shown to-day will, in a faint measure, help those who look at them to realize the beauties of a few of these places.

Few countries can produce such a long roll of eminent men as Rajputana. To begin with Meywar, there have been few greater warriors than Sanga Rana, who at the time of his death was only the fragment of a man, having lost an eye and an arm, besides having received no fewer than eighty wounds in the cause of his country. No less great was Kambhu, of whom the Mohammedan historian, after relating his victory over the King of Malwa, dilates on his greatness of soul in setting his enemy at liberty, not only without ransom but with gifts. The life-long struggle with the Moghul empire of Partap will never be forgotten by his race, and the beautiful letter of Rana Raj Singh to Aurangzeb, remonstrating on behalf of his nation against the intolerant persecution of that bigot, has often been quoted with admiration. Marwar produced so long a line of valiant princes that an exception is almost unknown. Especially famous were Sur Singh, Gaj Singh, Jaswant Singh, and Ajit Singh. Some of these were viceroys of the emperors in distant lands and patrons of art and literature, but in the latter capacity none equalled the famous founder of Jaipur. Siwai Jai Singh, who reformed the calendar, wrote histories, built observatories the remains of which exist to this day, and was, in addition, one of the most skilful generals and greatest politicians of his age. Raja Man Singh of the same royal house was, in succession, viceroy for the Moghuls of Kabul, Bengal and Orissa. In two battles twelve of the royal blood of Bundi and Kotah died, with the heads of every Hara clan, to maintain their promised fealty to the Delhi house. It is unnecessary to pursue this theme, but one can only wonder that it was followed by so much decay. That this was due, in a very large measure, to the shrewd action of the Mahrattas in employing European adventurers to organise their forces on modern principles cannot be doubted, but the folly of the Rajputs led, in the first instance, to the interference of the Mahrattas themselves in Rajputana affairs, and the beginning was due to the jealousy of the rulers of Jaipur and Marwar, who were both candidates for the hand of Krishan Kumari, the beautiful daughter of the Maharana of Udaipur.

This struggle led to the invitation of the foe to interfere, and not only to the ruin of the country, but to the death of the innocent princess, who was compelled to take poison, though she was not unavenged. A patriotic noble of Mewar cursed the instigator of the deed, and foretold that no chief of Udaipur should ever again have a son who would directly succeed him.

The late Sir Edward Arnold recited a beautiful ballad describing this sad history, in my own house, which was formerly the residence of the minister of Jaipur, one of the states concerned in the events which he eloquently narrated, and I would strongly recommend all who are interested in the Rajputs to read his charming verses, as none can do so unmoved.

Had time permitted I would have written of the wonderful resemblances of many of the Rajput customs, practices, and ceremonies to those of the ancient Semitic races and particularly of the Jews, but failing this opportunity would point to the suggestiveness of many of the portraits of Rajput princes which I have brought for your inspection, which may perhaps be considered of double interest in view of the little that is known of the remote history and the date of the first appearance of the tribe in India. I think, moreover, that some account of a living people which seems so allied in customs, history, and in many other ways to the ancient Biblical nations of Asia cannot fail to be of special interest, from many points of view, to the members of this Society.

In conclusion I will briefly recapitulate as the causes of the long possession of power in the same regions of the Rajput race:—A climate and physical conditions which were best suited to the growth and maintenance in strength of both mind and body of a manly people, which could not have been kept up, as the history of other inhabitants of India has shown, in the hot plains of the peninsula. The presence in Rajputana of excellent situations and materials for building forts and places of refuge, and above all numerous inaccessible hills or deserts into which a secure retreat could be made in case of severe pressure. The patriarchal and tribal system which permitted of much personal freedom, while adequate provision was made for cooperation and united action if threatened by a foreign power. A common religion. Just and well understood laws of succession. Benevolent treatment of the commonality and competition for tenantry which the wide extent of land ensured. A patriarchal system of justice. A fairly wide-spread toleration of the religion and customs of the

people of other faiths than their own. And lastly occupation, in peace as well as in war, of a manly race as afforded by the amount of game and the numerous preserves, without any great pressure from unrighteous forest laws, which could not press in any case very seriously when most of the people did not require game for use as food.

The very failures in ensuring absolute success prove, I think, that, on the whole, these conclusions are correct, but, if there were not justice and manly strength, none of the causes which I have enumerated would have been of any avail, and so I would end my paper with the motto of the famous prince Siwai Jai Singh of Jaipur, "YATO DHARM STATO JAI"—Where there is virtue (or all the great virtues—whether religious or virile—for such is the comprehensive meaning of the word *dharm*) "THERE IS THE VICTORY."

#### DISCUSSION.

The CHAIRMAN remarked on the extreme interest of the paper; and thanked the author for the trouble he had taken in the preparation both of the coloured pictures and the excellent lantern slides of the beautiful buildings and rich surroundings of the cities of Rajputana, and called for observations from those present.

The SECRETARY wished to associate himself with the views of the Chairman regarding the great interest of the paper and the beauty of the illustrations. No one was better qualified than Colonel Hendley for giving a true description of this splendid dependency of the British Empire, owing to his long residence in Jeypore, his intimate relations with the late and present Maharajah, who showed his loyalty to the Crown by his presence at the Coronation of King Edward VII. It should also be recollected that Colonel Hendley was instrumental in bringing together into one Museum at Jeypore a large collection of Indian works of art, and of setting up a meteorological observatory; in all of which undertakings he had the support of the Maharajah and of the British resident. He, the Secretary, thought these were points which ought to be mentioned on the present occasion.

The CHAIRMAN, on behalf of the meeting, cordially thanked the author for his most interesting paper, and the proceedings terminated.

## ORDINARY GENERAL MEETING.\*

COLONEL T. H. HENDLEY, C.I.E., IN THE CHAIR.

The Minutes of the previous Meeting were confirmed.

The SECRETARY read a telegram from the Rev. J. B. Whiting expressing his regret that he was unable to be present, his medical advisers having forbidden it.

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### DEATH OF REV. DR. F. A. WALKER.

The SECRETARY also alluded to the death of the Rev. Dr. F. A. Walker, F.L.S., which took place on January 31st, and which was a great loss to the Institute. Dr. Walker had travelled in Iceland and studied the insects of that country and had written several papers. He (the Secretary) had, on behalf of the Institute, attended the funeral on Saturday last, and he was sure it was the wish of the Society that he should express their regret and sympathy with the widow and family.

Mr. ROUSE said he wished informally to express for himself his regret to hear of the death of Dr. Walker. He spoke of his genial manner and Christian character, and expressed the hope that some one would be raised up to fill the gap which his death had caused in the ranks.

Professor ORCHARD also expressed his regret and remarked on the almost encyclopædic knowledge which Dr. Walker possessed on many subjects.

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Mr. Whiting's paper, entitled "The Growth of the Kingdom of God," was read by the Secretary, and discussion followed.

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\* Monday, February 6th, 1905.

## THE GROWTH OF THE KINGDOM OF GOD.

By Rev. J. B. WHITING, M.A.

**I**N a very interesting paper, read before this Institute three years ago, Professor Lobley traced the vast succession of animal and vegetable creatures, as a preparation of the earth for man.\* This preparation, which ultimately covered the earth, was orderly, gradual and final. It bore evidence of having been planned by a mind of wisdom, and carried out by an arm of power. The work was long, there was no hurry. It was the work of God.

We instinctively look for a similar process in what we signify as the Kingdom of God.

We believe in God. The idea of God leads to the conviction that there has been purpose, plan and preparation. We look for successful development; but that development may not be obvious for a long time.

It is, I think, only recently, that we are struck by the fact that an enormous growth has taken place, "The Kingdom of God is like a grain of mustard seed, which a man took and cast into his garden; and it grew and waxed a great tree."

"This Kingdom" is likened to a field, which contains both tares and wheat. It is of the growth of this Kingdom of God that we assert that it is the subject of an eternal purpose; a divine plan, an intelligent preparation, wherein God hath abounded in all wisdom and prudence, and for which He has "appointed" times and seasons.

Before we proceed further let me adduce evidence of the growth of this Kingdom of God; bearing in mind that it consists of all who call themselves Christians.

The evidence shall be (1) in regard to the population of the world, (2) in regard to the shifting of political power from non-Christian to Christian Governments. Both these lines of inquiry lead us to perceive that this Kingdom of God has become "a great Tree."

When the Saviour became Incarnate, enormous tracts of the earth's surface were without inhabitants. We may take an illustration of this fact. Africa contains 12,000,000 square miles, exactly one-fourth of the habitable surface of the earth,

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\* *Trans. Vict. Inst.*, vol. xxxiv.



they had fled under stress of hunger. Such facts as this show how the native of India clings to his land and home, and what a great amount of wrong is required to drive him away for good, yet it also points on the whole to a just and paternal treatment.

What tended most to preserve such a rule was a common religion, which, while it allowed much elasticity in some ways, such as variety of sect and local practice, did not usually persecute for such divergencies, and its very humane nature which permitted a man to do so many personal things without hindrance that, in perhaps better regulated and more straitlaced communities, are prohibited. Thus, for example, a man will shut up a street if he wishes to give a caste feast on some family occasion; he will get the loan of horses, elephants, camels, furniture, and even of a few soldiers when he has a marriage in hand, and desires to shine a little before his neighbours; and he will have the right to a seat, or at least a standing place, in the little court of the noble, even if he is only a small shop-keeper: and he may as the head of his guild or fraternity, sit in judgment on his caste men in petty disputes, and lastly, his body may be carried sitting up instead of in a recumbent position to the cremation ground, his chief being present. Then again, if he is one of the nobles or officials, he will have something to say when his sovereign dies as to the succession.

The rules of succession to position and property in Rajputana have had very much to do with the permanency of Rajput rule. Unlike the Mohammedan Emperors, whose rules for themselves and their nobles as well as officials were most irregular, the Rajput had fixed principles which were followed at every succession both of a chief and of his nobles.

All were therefore equally interested in keeping these regulations and in preserving the system which admitted them. Mohammedan successions were far from regular. The strongest, or most unscrupulous, won in the almost inevitable struggle which followed upon the death of the last sovereign, and his death was not always waited for, as for example in the case of even the great Akbar himself, whose grandson Khusru strove to obtain the empire to the prejudice of his father Jehangir. This scheme some authorities say even the emperor attempted to stay by giving the rebel's own supposed supporter Raja Maun Singh of Jaipur, poisoned *pān* or betel with his own hand, which, however, he took by mistake himself, thus causing his own death. So also Aurangzeb, by cunning and fighting, won the empire from his brothers and actually deposed his father Shan Jehan, the deed.

of blood being amply revenged upon his descendants, of whom 21 out of 27 died violent deaths. The evil existed in all ranks, because upon the demise of a noble or high official his possessions passed to the crown, his natural heirs only receiving enough to live upon. Can it be wondered then that the Rajputs and the people generally preferred a system which had some elements of permanency in it, and that not even the Mohammedans were wholly in favour of regulations which destroyed all the natural incentives of working for a man's own family and of founding a home and keeping in memory a name.

Ordinarily then the succession in Rajputana was hereditary, but when there were no sons the Hindu laws, which admitted of adoption of some lad of the royal line, were followed. This practice admitted of the choice of the most promising scion of the family who was at the moment capable of adoption.

Of course there was not unfrequently much scope for intrigue, but on the whole if the main stem had proved unworthy, there was a change for the better, and the ancient lineage was always preserved. Such a case occurred while I was at Jaipur. The Maharaja was the last of the direct line, and on his deathbed it became necessary to inquire whom he wished to succeed him, he replied, "The next of kin according to the Shastras," or Hindu Scriptures. This would have led to some dispute, because tribal and local customs and state views might have given rise to differences of opinion, so that a few minutes later he was induced to speak more definitely, and then named a young man, who was of the family, and who, being the second son, was not required to perform his own natural father's funeral rites, and was therefore capable of being adopted by another. This youth succeeded, and is now the capable, though conservative and popular chief of the state who came over to England for the coronation of our King. There were several important considerations however that arose in this case that are illustrative of the subject, as, for example, the facts that the widows of the chief had also a voice in the matter as well as the nobles and the members of the state council, all of whom agreed. In case of a death without nomination of an heir the same principles will be followed, but the widow would nominate by the advice of the other parties.

The Paramount Power has always, certainly since Moghul times, held, and exercised as far as it could, the right of final approval. The Moghuls, it will readily be surmised, would interfere the more often in order to back up their own system of succession, and to enable them to keep down their most truculent opponents.

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The rules of succession to position and property in Rajputana have had very much to do with the permanency of Rajput rule. Unlike the Mohammedan Emperors, whose rules for themselves and their nobles as well as officials were most irregular, the Rajput had fixed principles which were followed at every succession both of a chief and of his nobles.

All were therefore equally interested in keeping these regulations and in preserving the system which admitted them. Mohammedan successions were far from regular. The strongest, or most unscrupulous, won in the almost inevitable struggle which followed upon the death of the last sovereign, and his death was not always waited for, as for example in the case of even the great Akbar himself, whose grandson Khusru strove to obtain the empire to the prejudice of his father Jehangir. This scheme some authorities say even the emperor attempted to stay by giving the rebel's own supposed supporter Raja Maun Singh of Jaipur, poisoned *pān* or betel with his own hand, which, however, he took by mistake himself, thus causing his own death. So also Aurangzeb, by cunning and fighting, won the empire from his brothers and actually deposed his father Shan Jehan, the deed.

of blood being amply revenged upon his descendants, of whom 21 out of 27 died violent deaths. The evil existed in all ranks, because upon the demise of a noble or high official his possessions passed to the crown, his natural heirs only receiving enough to live upon. Can it be wondered then that the Rajputs and the people generally preferred a system which had some elements of permanency in it, and that not even the Mohammedans were wholly in favour of regulations which destroyed all the natural incentives of working for a man's own family and of founding a home and keeping in memory a name.

Ordinarily then the succession in Rajputana was hereditary, but when there were no sons the Hindu laws, which admitted of adoption of some lad of the royal line, were followed. This practice admitted of the choice of the most promising scion of the family who was at the moment capable of adoption.

Of course there was not unfrequently much scope for intrigue, but on the whole if the main stem had proved unworthy, there was a change for the better, and the ancient lineage was always preserved. Such a case occurred while I was at Jaipur. The Maharaja was the last of the direct line, and on his deathbed it became necessary to inquire whom he wished to succeed him, he replied, "The next of kin according to the Shastras," or Hindu Scriptures. This would have led to some dispute, because tribal and local customs and state views might have given rise to differences of opinion, so that a few minutes later he was induced to speak more definitely, and then named a young man, who was of the family, and who, being the second son, was not required to perform his own natural father's funeral rites, and was therefore capable of being adopted by another. This youth succeeded, and is now the capable, though conservative and popular chief of the state who came over to England for the coronation of our King. There were several important considerations however that arose in this case that are illustrative of the subject, as, for example, the facts that the widows of the chief had also a voice in the matter as well as the nobles and the members of the state council, all of whom agreed. In case of a death without nomination of an heir the same principles will be followed, but the widow would nominate by the advice of the other parties.

The Paramount Power has always, certainly since Moghul times, held, and exercised as far as it could, the right of final approval. The Moghuls, it will readily be surmised, would interfere the more often in order to back up their own system of succession, and to enable them to keep down their most truculent opponents



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COLONEL T. H. HENDLEY, C.I.E., IN THE CHAIR.

The Minutes of the previous Meeting were confirmed.

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### DEATH OF REV. DR. F. A. WALKER.

The SECRETARY also alluded to the death of the Rev. Dr. F. A. Walker, F.L.S., which took place on January 31st, and which was a great loss to the Institute. Dr. Walker had travelled in Iceland and studied the insects of that country and had written several papers. He (the Secretary) had, on behalf of the Institute, attended the funeral on Saturday last, and he was sure it was the wish of the Society that he should express their regret and sympathy with the widow and family.

Mr. ROUSE said he wished informally to express for himself his regret to hear of the death of Dr. Walker. He spoke of his genial manner and Christian character, and expressed the hope that some one would be raised up to fill the gap which his death had caused in the ranks.

Professor ORCHARD also expressed his regret and remarked on the almost encyclopædic knowledge which Dr. Walker possessed on many subjects.

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Mr. Whiting's paper, entitled "The Growth of the Kingdom of God," was read by the Secretary, and discussion followed.

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\* Monday, February 6th, 1905.

## THE GROWTH OF THE KINGDOM OF GOD.

By Rev. J. B. WHITING, M.A.

IN a very interesting paper, read before this Institute three years ago, Professor Lobley traced the vast succession of animal and vegetable creatures, as a preparation of the earth for man.\* This preparation, which ultimately covered the earth, was orderly, gradual and final. It bore evidence of having been planned by a mind of wisdom, and carried out by an arm of power. The work was long, there was no hurry. It was the work of God.

We instinctively look for a similar process in what we signify as the Kingdom of God.

We believe in God. The idea of God leads to the conviction that there has been purpose, plan and preparation. We look for successful development; but that development may not be obvious for a long time.

It is, I think, only recently, that we are struck by the fact that an enormous growth has taken place, "The Kingdom of God is like a grain of mustard seed, which a man took and cast into his garden; and it grew and waxed a great tree."

"This Kingdom" is likened to a field, which contains both tares and wheat. It is of the growth of this Kingdom of God that we assert that it is the subject of an eternal purpose; a divine plan, an intelligent preparation, wherein God hath abounded in all wisdom and prudence, and for which He has "appointed" times and seasons.

Before we proceed further let me adduce evidence of the growth of this Kingdom of God; bearing in mind that it consists of all who call themselves Christians.

The evidence shall be (1) in regard to the population of the world, (2) in regard to the shifting of political power from non-Christian to Christian Governments. Both these lines of inquiry lead us to perceive that this Kingdom of God has become "a great Tree."

When the Saviour became Incarnate, enormous tracts of the earth's surface were without inhabitants. We may take an illustration of this fact. Africa contains 12,000,000 square miles, exactly one-fourth of the habitable surface of the earth,

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\* *Trans. Vict. Inst.*, vol. xxxiv.

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from the Church, but who bravely went thrice to preach to the Mahommedans, in Africa, and was finally martyred amongst them. There was one other whom McLear does not mention who went all the way to China. But these were the only Roman Catholic missionaries through four centuries and a half.

I cannot agree that it was part of God's plan that the monks should remain in their cloisters, a few of them writing out the Scriptures in Greek and Latin and none doing anything towards spreading a knowledge of them. It required Wycliffe to come into the world and send out his bodies of good men, two by two, over the land, with copies of the Scriptures in their native language, before the word of God could be spread. And what did a leader of the Roman Catholic Church then say—that Wycliffe was casting his pearls before swine; and yet, as Milton remarks, if the Lollards had not been crushed, we should have been the foremost nation in the world in establishing the Reformation in Europe.

Yet, while the Western Church was apathetic, and while the monks in their cloisters were leading lives of little use, there was a body of Christians who were preaching to the heathen world, had ventured right into China, and in India and Burmah had become a great power, with a multitude of converts, but who were regarded by the Roman Catholics as heretics. These were the Nestorians, who have left a monument in Northern China dating from the sixth century. The mistake of the Nestorians, however, was that they did not translate the Bible into the language of the people. Had they done so, their work would have been permanent everywhere. In China there is not a vestige of it left.

Colonel Hendley has told us how Christian supremacy in India is destroying evil customs. We might allude to the customs that formerly prevailed and which the English government has suppressed—the burning of widows on the funeral pyres of their husbands, the drowning of children in the Ganges, the self-destruction of men beneath Juggernaut's car. It has also hindered the very early marriages of Hindus by raising the minimum of age by two years; and of course it has put down lawless crime and violence in all directions. Let us hope that it will succeed in doing a vast deal more. We may further allude to the fact that the English Government has encouraged and established leper hospitals and many institutions for the benefit both of mind and body in India; and undoubtedly

the Hindus in seeing these things cannot but conclude that Christianity is a true religion.

The pagans had no public hospitals or poor-houses or asylums for the advantage of the dumb, the blind, the lame and the insane such as we see spread over Christian countries ; still less any society such as Christian England set the example of founding for protecting poor animals.

Professor LANGHORNE ORCHARD.—Since “nature” and God’s spiritual kingdom are both under the same King, we shall agree with the author of this interesting paper that both may be expected to evidence a similar process of government and working. Undoubtedly, history brings before us “Purpose, Plan, Preparation, and fixed Times,” evident in the growth of the Kingdom of God. The instances adduced from prophecy and from general history abundantly illustrate this pre-arranged timing of events. In connection with the preparation of a “suitable cradle” for Christianity, it is very noticeable that Alexander the Great died just at a time so specially critical, and that Seleucus transplanted two thousand Jewish families into all the cities of his kingdom. Things like these, which cannot be accounted for by any theory of coincidence, constitute a strong, and indeed decisive, argument in favour of the author’s thesis.

I am glad that the author clearly affirms his belief in human free-will. Without free will there cannot even be morality. God never over-rides free will. But, though He does not over-ride, He uses and over-rules it, to carry out His own purposes. If a statesman, gifted with the wisdom and insight of a Bismarck, could so correctly guess as to what men would do, as often to make their actions subserve his plans, can we find any difficulty in believing that the certain fore-knowledge and unerring wisdom of God employs and over-rules all results of human free-will?

The great philosophies referred to by the author, reinforced, by the conclusions of the intellect, the conclusions of the heart. Their failure helped to prepare the way of the Lord.

After some observations by Colonel Alves, a cordial vote of thanks to the author was passed and the meeting separated.

## ORDINARY GENERAL MEETING.\*

PROFESSOR LIONEL S. BEALE, V.P., F.R.S., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed.

A paper on "Biblical Astronomy" was read by Lieut.-Colonel G. Mackinlay, late R.A.

### *BIBLICAL ASTRONOMY.*

By Lieutenant-Colonel G. MACKINLAY (late R.A.).

THE present seems a good time to consider the subject of Biblical Astronomy, on account of the recent advances in

- (1) Biblical Scholarship.
- (2) Discoveries and decipherment of ancient inscriptions, etc.
- (3) Astronomy.

*Scholarship.*—It must be remembered that the languages of the Bible are comparable to a tool used by the divine Author; those languages are foreign ones to us, and a mere literal translation cannot in every case give the full meaning. During a residence in Spain, I found that even a certain mastery of the Spanish language was not in itself sufficient to bring me into real contact with the people. I had also to study the Spanish character and the Spanish attitude of mind. The difficulty of rendering the exact meaning intended by the writers of the Bible, with their ancient Eastern methods of expression, is certainly greater than that which exists at the present moment in translating a modern European book into English.

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\* Monday, 20th February, 1905.

As Max Müller puts it, "when first we begin to learn a new language it seems easy . . . but the more we learn it, the more difficult do we find it to discover words which will really square with our own words."

As the divine scriptures are written for all nations and for all times, the main essential truths are plainly put forward; but when we come to seek for the full force of some of its sentences we thankfully accept the help afforded by careful scholarship.

*Ancient Inscriptions, etc.*—The fast accumulating translations of ancient inscriptions afford ample confirmation of the numerous Biblical allusions to the worship of the host of heaven.

Great assistance is given to ancient chronology; the account of a total eclipse recorded as seen at Nineveh 763 B.C. has been verified by calculation as having occurred at the date stated, when the band of totality passed about 100 miles North of the city. The eccentricities of the Egyptian Calendar, which moved its months through the seasons in a long cycle of some 1,565 years, have been helpful; as when it is stated that the Nile rose on a certain day of any one month, the date is necessarily fixed within a very few years.

Sir Norman Lockyer and others have shown that the dates of the construction of various Egyptian and Greek temples oriented to the risings of stars can be known within comparatively a few years, as the precession of the equinoxes (see Appendix) gradually rendered their central avenues of pillars quite unfitted for their astronomical purpose of allowing the rays of the rising star to enter and illumine the images in the central interior shrines, after a period which varied according to circumstances, but which may have averaged 300 years.

Even the statements of astrology giving the position of planets at the birth of a child afford chronological data; Professor Flinders Petrie thinks that the position of the planets indicated on certain ancient Egyptian diagrams show that the dates of birth of Rameses II. and Rameses VI. were respectively B.C. 1318 and 1198. We may, however, doubt the accuracy of the records in some cases, as a desire to please royalty may have tempted the artists to depict more favourable astrological arrangements of the planets than the true ones.

*Contrast of Standpoints.*—The appearance of the celestial orbs has little interest to most of us moderns, unless we are astronomers, surveyors, or sailors; we have no temptation to worship them, nor do we expect any control of our future by

their movements. Our climate prevents us from seeing them, especially when they are near the horizon, except at uncertain intervals; a large number of us live in towns lighted by gas and electricity, and thus the brilliancy of the stars is eclipsed. If we travel at night, we enter a well lighted railway carriage and we look outside it but little; we have good almanacks and clocks, and consequently most of us have no need to consult the celestial time-keepers, which regulate the earthly ones, and as our civil calendar has nothing to do with the moon, the variation in its appearance is not a matter of importance.

The modern astronomer is accustomed to refer his observations for accuracy to the vertical meridian. He believes most of the theories of the ancients were wrong, and consequently he generally bestows little thought on the efforts of man long ago to wrestle with the problems of the heavens, notwithstanding the fact that the length of the year, the correct arrangement of the calendar, and the direction of true north, were accurately known from the results of laborious observations some thousands of years ago.

But in Bible times how different was the standpoint. The heathen nations surrounding the Hebrews paid great attention to astronomy, and this is proved by the frequent, perhaps invariable, orientation of their temples to the rising or setting of the sun at a solstice, or at an equinox, or to the rising of some star. The study of astronomy was intimately connected with heathen worship. Professor Sayce tells us that the first known observatories in the world were those attached to Babylonian temples, which were generally dedicated to one of the heavenly host, or to some god connected with one of them by ancient myth. The priests were the observers, and under the authority of the king they regulated the calendar; they dabbled in astrology, doubtless for gain, and in order to keep up their power over the people. The Hebrew authors of the Scriptures, on the other hand, drew attention to the heavens in order to declare the glory of God, or to make some grand parallel to His grace and mercy. In Bible lands there is a bright clear atmosphere and a genial climate: there was little artificial light at night, and that only dim, and there was little hiding of the heavens during travel. The lunar month was employed by the Hebrews for their calendar, and consequently the position and appearance of the moon indicated the progress of the month. Almanacks and time-measuring instruments were few and rude, and hence the ancients generally must have frequently consulted the heavenly bodies for various purposes. Astro-

nomical observations were generally made on the visible horizon of risings and settings, although some, as at the Great Pyramid, were doubtless made on the vertical meridian.

The contrast between our modern western and the ancient eastern use of astronomy for practical purposes was brought to my notice in a very matter-of-fact sort of way some 30 years ago, when travelling with my wife by ordinary marches in the lower valleys towards Cashmere. We were in the habit of rising about an hour before daybreak, so as to be dressed and ready to start with the earliest streak of dawn, and thus avoid as much as possible the heat of the coming day. The native servants used to look at the positions of the stars during the night from time to time, until they judged that it was about an hour before daybreak, and as they did this from night to night they became very fairly accurate. They then called me, and I looked at my watch, and we got up at once or delayed a little according as their estimate had been fast or slow. One day a very long march down a hot valley was before us, and I was specially anxious to start in good time. Unfortunately my watch had stopped the day before, and it was the only timekeeper in all our little party. Before turning in at night I had a good look at the stars, and roughly estimated what their position should be at the time for our rising next morning. I got up during the night to look for myself, and then I found the heavens indicating, as I thought, about an hour before dawn; but not a move did I perceive among the servants and coolies, and when I woke them up they assured me that it was not yet time. However I insisted upon it that daybreak must soon come, so we rose, struck tents, packed up and drank the early coffee, but still no signs of morning! It was no use to wait, so off we started in the dark with a lantern; presently the path led into a dark wood, and then it skirted the edge of a hill with a precipitous fall on the left hand, which made it somewhat dangerous without daylight. Our progress was slow, and I began to realise that I had made a mistake, and that the Easterns who had been accustomed to judge of the time night after night from the position of the stars, were more to be trusted for practical purposes than the Western who attempted to do so for the first time after a single rough estimate the night before.

It is no uncommon thing for a servant in India to glance at the position of the sun in the heavens, and then make a very fair estimate of the time of day. Of course an Englishman could also do this if he practised this habit of observation, but our universal possession of watches and clocks hinders us from



seeking to attain this facility of telling the time direct from the heavens.

I was wondering the other day whether the intelligent modern would recur to the ancient methods of making direct use of the movements of the stars, when deprived of the ordinary clocks, etc., of present day civilisation. I therefore enquired of those who had been engaged in our late war in South Africa, and soon heard the following from an army nursing sister, Miss Watson Tulloh, R.R.C.

A young officer suffering from measles was a patient under her care at Norval's Pont in an isolation tent, and during convalescence he watched for her daily visits. As he had no clock or watch, he made use of the heavens, and he soon noticed that the nurse's last round, which was about a couple of hours after the winter sunset, was paid just when a bright star rose over a neighbouring kopje, and on the following evenings the same star again gave him due notice, though the length of warning increased a little each time. The incident would probably have been forgotten except for the facts which occurred afterwards: a false report of the officer's death, accompanied by a portrait, was published in the newspapers; a little later he was wounded in an engagement and brought back to the same hospital and to the same nurse. She recognised his features at once, but thought he must be some near relative of her former patient, and was only assured of his identity by his reminding her of the bright star rising behind the kopje!

We may conveniently divide our subject into the following sections:—

1. Jehovah, Creator and Ruler.
2. Worship of the heavenly bodies forbidden.
3. The Hebrew calendar.
4. Direction and orientation.
5. The heavens.
6. Grand astronomical statements.
7. Figurative allusions.

#### (1) JEHOVAH, CREATOR AND RULER.

In Gen. i, 1, we are told that God *created* the heaven, and afterwards in the sixteenth verse that He *made* or ordained the sun, moon and stars for their purposes. I do not stop to discuss how the current theories about the origin of the universe fit in

with the brief majestic statements in Scripture, but I would note that as we pass on through the Bible we find a very large number of similar statements of God's creative and ruling power made by various writers, with unerring consistency, right up to and through the times of the New Testament.

A few only are now quoted.

"Thou hast prepared the light and the sun" (Ps. lxxiv, 16 ; see also Ps. viii, 3, and lxxxix, 11); "Him that by understanding made the heavens" (Ps. cxxxvi, 5, 7; see also Prov. iii, 19); "Lift up your eyes on high, and behold who created these things" (Is. xl, 26; see also xlv, 18); "All things were made by Him" (John i, 3; see also Col. i, 16; and Heb. iii, 4).

Certain miraculous astronomical events are emphatically narrated in Scripture. The sun standing still (Josh. x, 12-14; Is. xxviii, 21; Hab. iii, 11). The shadow moving backward on the dial (II Kings xx, 10-11; Is. xxxviii, 8; II Chr. xxxii, 31). The star at Bethlehem (Matthew ii, 9). The failing of the light of the sun at the Crucifixion (Matt. xxvii, 45; Mark xv, 33; Luke xxiii, 44). These have been difficulties to many; but no one can deny that they are not in strictest accord with the repeated statements that God is ruler of the heavens.

The Bible records astronomical facts as they *appear* to an ordinary observer; no scientific astronomer can object to this, as he himself (using popular language) speaks of a "new moon,"\* of the rising and setting of the heavenly bodies; and even in his own technical arrangements, a star is said to "cross the wires" in the field of view of the transit instrument. Whatever explanation we give of the extraordinary events narrated in the Bible, the fact remains that they are recorded as miraculous exhibitions of divine power.

The majestic titles of Maker and Lord of Heaven are often used in Scripture, specially by believers in Jehovah when they addressed the heathen; the hearers could understand something of the glory indicated by those names, though they were ignorant of His spiritual attributes of righteousness and mercy.

Thus we find both Melchizedec and Abraham, in the presence of the king of Sodom, speaking of God as "the Possessor" or

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\* A lady friend beginning to take an interest in astronomy was once talking to me about the *new* moon, and said she often wondered what became of the old ones! If the conventional language of prosaic English needs some care in order to understand it, can we wonder if Eastern expressions are not always to be taken quite literally?

"Maker of heaven and earth" (Gen. xiv, 19, 22). The heathen governor under Darius reported to him that the Jewish elders stated that they were "servants of the God of heaven and earth" (Ezra v, 11), and Darius uses the same title of Jehovah in his letter of reply (Ez. vi, 9). Artaxerxes also addresses Ezra as "the Scribe of the Law of the God of heaven" (Ez. vii, 12 and 23). Jer. x, 11, is in Aramaic, probably that it might serve as a special message to the Chaldeans: "Thus shall ye say unto them, the gods that have not made the heavens and the earth, these shall perish"; and then in Hebrew the prophet states to the Jews that the Lord "stretched out the heavens." Daniel uses the titles "God of Heaven" before Nebuchadnezzar (Dan. ii, 44), and "Lord of Heaven" before Belshazzar (Dan. v, 23). Jonah names Him "God of Heaven" (Jonah i, 9) before the heathen sailors; and in the New Testament, Paul and Barnabas at Lystra speak of the "living God who made the heaven and the earth" (Acts xiv, 15), and again at Athens, Paul spoke of Him before the Greeks as "the Lord of heaven and earth" (Acts xvii, 24, R.V.).

The majestic Psalms of the day (xix) and of the night (viii) each begin by demonstrating the glory given to Jehovah by His vast works in the universe; the former announces that "the heavens declare the glory of God," while the latter addresses Him, who has set His "glory above the heavens."

In some places God's great work of creation is linked with His great work of atonement and redemption, as in Ps. xix, 1 and 14, "The heavens declare the glory of God . . . O Lord my rock, and my redeemer"; and Col. i, 16 and 20, "In Him were all things created in the heavens . . . through Him to reconcile all things unto Himself, having made peace through the blood of His Cross"; see also Prov. viii, 23, 27, and ix, 1, 2, "I was set up from everlasting . . . when He established the heavens I was there . . . wisdom . . . hath killed her beasts: she hath mingled her wine; she hath also furnished her table." Modern science can teach us nothing of the second of these great works, but the advances of astronomy have enlarged our knowledge of the vastness and grandeur of the universe, and consequently have taught us a fuller sense of the glory of the Maker and Ruler.

## (2) WORSHIP OF THE HEAVENLY BODIES FORBIDDEN.

Every careful reader of the Old Testament must be struck by the fact that worship of the heavenly host was very preva-

lent among the nations surrounding the Israelites in Old Testament times. The attention of readers of the Revised Version is more markedly drawn to this fact by the use of the correct term "Sun images" in the text instead of "images" only for the Hebrew word "Chammanim" in the text of the Authorised Version (Lev. xxvi, 30, Is. xvii, 8, etc.). A little further search into the meanings of some proper names (*e.g.*, Beth-shemesh, Potiphera, Tammuz, Ashteroth-Karnaim, Sennacherib, etc., of which the first three refer to the sun and the last two to the moon in different languages) show us that this form of false worship was very widespread indeed. Modern discoveries tell us the same thing, and numbers of temples have been found dedicated to one or other of the orbs of heaven; not only in Egypt, Assyria, Asia Minor and Greece, but as far west as our own country, in which we have Stonehenge, and as far east as China, where there are remains of ancient Sun temples. Emblems of the divinity in the form of solar discs with wings have been found in large numbers. (See fig. 1.) We thus find a close agreement between Scripture and the old monuments.

We find stern denunciations in the Bible of all false worship, particularly of that of the host of heaven, "Take heed . . . lest . . . when thou seest the sun . . . thou be drawn away and worship" (Deut. iv, 19). "Worshipped . . . the sun . . . which I have not commanded," (Deut. xvii, 3) "Manasseh . . . built altars for all the host of heaven . . . wrought much evil in the sight of the Lord" (II Kings xxi, 5, 6). "If I beheld the sun when it shined, or the moon walking in brightness, and my heart hath been secretly enticed" (Job xxxi, 26, 27), and in the second commandment (Ex. xx, 4), the first forbidden image is that of anything in the heaven above.

In Ezek. viii, 16, we read of men who committed abomination "their faces towards the East and they worshipped the sun towards the East."

Sun worship still has many votaries among the Parsis; the Hindus also still worship the orb of day to a very large extent; and many remains of moon worship survive in the East both among Hindus and Mahomedans.

Max Müller tells us that the temples of Babylonia and Egypt were well provided with towers, for the double purpose of offering up sacrifices and for observation of the heavens. The temple at Jerusalem had no such towers; but we find at times when the Jews disobeyed the Lord they followed heathen

examples, worshipping the host of heaven on the tops of their own houses (II Kings xxiii, 12; Jer. xix, 13; Zep. i, 5).

Not only was the worship of the heavenly host interdicted, but a superstitious dread of any unusual appearance in the heavens was forbidden: "be not dismayed at the signs of heaven: for the nations are dismayed at them" (Jer. x, 2, R.V.).

The close connection between the false religions of the powerful nations on either side of the Holy Land and astronomy may have given a bad repute to the study of the heavens among the Hebrews themselves (Is. xlvii, 13); and we do not find it recorded that any of them excelled in this study, unless we except Moses, who was learned in all the wisdom of the Egyptians (Acts vii, 22), Solomon, whose wisdom "exceeded the wisdom of all the children of the East, and all the wisdom of Egypt" (I Kings iv, 30); and Daniel and his three companions, to whom God gave "knowledge and skill in all learning and wisdom" (Dan. i, 17). The mention of the wisdom of the Egyptians and of the children of the East in the first two of these instances, and the fact that Daniel and his companions gained this knowledge and skill in a foreign land, all point to the conclusion that science in general (including astronomy) was more studied in the great countries of Egypt and Chaldea than among the Israelites.

#### THE HEBREW CALENDAR.

The Bible account of the origin of the Hebrew nation tells us that the founder Abraham came from Ur of the Chaldees, and that he was careful that his descendants should marry among his own relatives; his grandson Jacob also spent many years of his life in Mesopotamia, and he eventually migrated with all his descendants to Egypt, where they lived for some 215 years. We are further pointedly told that, although the children of Israel lived in Egypt so long, they were only there as "strangers" (Gen. xv, 13; Ex. xxiii, 9; Deut. x, 19; xxiii, 7), and they left it by divine command to seek out their own long promised land. Bearing these statements in mind, we should expect to find that the Hebrews more nearly followed the Babylonian than the Egyptian calendar (if we can trace what each was), notwithstanding their long sojourn in the land of the Pharaohs.

The ancient records fully confirm this expectation; we find from them that the Babylonians, who belonged to the Semitic race as well as the Hebrews, had a calendar in which the year was composed of twelve lunar months of 29 and 30 days,

with an additional month inserted about every third year to prevent them from moving through the seasons; this was also the arrangement of the Israelites, who, however, possessed their own peculiarities of calendar; for instance, at the beginning of their national life they simply indicated a month by its number, while the Babylonians assigned special names to each. They also had special feast times and sabbaths.

The Egyptians (a race quite foreign to the Israelites), on the other hand, had equal civil years of 365 days each, regulated by the sun alone, and divided into twelve non-lunar months of thirty days each, with a separate and added period of five days; while the Egyptian sacred year was corrected on much the same principle as that which we now adopt in our leap year arrangement.

In Babylonia much attention was given to the moon, witness the remains at the present moment of a temple to the moon god at Abraham's own town of Ur. Temples to the sun god are very numerous in Egypt, but those to the moon are rarer.

When the Hebrews lived in Egypt they must doubtless have used the Egyptian calendar, at any rate in their dealings with the inhabitants of the land, and possibly they used the Babylonian luni-solar calendar, or a similar one, among themselves as the Jews do now; but this is not very likely, as at first they were few in number, and they then had no great feasts of their own to observe. But from the time of the first passover they gave up the Egyptian calendar altogether, and the Lord's words to Moses, "This month" (evidently a strictly lunar one) "shall be unto you the beginning of months, it shall be the first month of the year unto you" (Ex. xii, 2), emphasizes the break with the land of the oppressors. This abandonment of the Egyptian calendar must have needed great skill and wisdom on the part of Moses to carry out,\* and it was of a piece with the general policy to prevent any return to the land of Egypt, which was naturally in the

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\* The tenacity with which an old calendar may be clung to is shown by the fact that in two Mahommedan countries with strictly lunar years, Morocco and Persia, there are still remains of another calendar. In the former country, the time for sowing is regulated by almanacks in which the actual names of the Roman non-lunar months still survive (letter from G. Michell, Esq., H.B.M. Vice-Consul Casa Blanca, Morocco). And in Persia governors assume their offices on the first day of the year, which is computed according to the old Persian solar reckoning. (Letter, Rev. H. St. Clair Tisdall missionary in Persia.)

minds of some (Ex. xvi, 3; Numbers xiv, 4; Acts vii, 39). The beginning of an Israelitish month at the appearing of the new moon was announced by the blowing of trumpets\* (Numbers x, 10).

Our present calendar is the outcome of the old Egyptian one, through Roman channels, several times altered, and not even now uniformly adhered to in Europe, as Russia has not yet adopted the last correction. The Hebrew calendar has lived on unchanged, and it also forms the basis for regulating our Easter and Whitsuntide.

*The Sabbath.*—Some say that as the four quarters of the moon (new, full, and the waxing and waning halves) are periods of definite change, that the week of seven days has its origin in being roughly the quarter of  $29\frac{1}{2}$  days, which is approximately the period of a lunation. But we must put aside this vague guess, in view of the positive scriptural statement that the Sabbath was instituted because "God rested the seventh day, wherefore the Lord blessed the seventh day, and hallowed it" (Ex. xx, 11), and we must conclude, in agreement with the author of the article on "Astronomy" in the *Encyclopedia Britannica*, that the origin of the Sabbath is divine.

It has been said that the Sabbath was borrowed from the Babylonians, since they always began the month with the new moon,—a day which was considered unlucky for some purposes,† and every succeeding seventh day in the month was likewise so distinguished; the fifteenth day being called "Sobat," a word which Dr. Pinches believes to be of ancient Accadian origin and meaning "rest of the heart" or "middle" (of the month). It is quite possible that the Babylonians may have retained some trace of the divinely appointed Sabbath, and the actual Hebrew word "Shabbath" may have been derived from the same ancient language. The Hebrew arrangement of strictly weekly Sabbaths was not the same as the Babylonian one of unlucky days, as new moon and sabbath did not always fall on the same day (II Kings iv, 23), and consequently, the 15th of the month, the Babylonian "Sobat," could only sometimes be a Hebrew Sabbath.

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\* The Hindus blow trumpets on new moons. (Letter, Rev. A. Margöschis, Tinnevely, S. India.)

† Hindus do not sow their fields or reap on new moon days and, in general, important work is not undertaken on those days. (Rev. A. Margöschis.)

Other traces of septiform arrangement are found among the ancient nations near the Israelites. Several of the constellations were considered to be composed of seven bright stars.\* The Egyptians are not known to have had any plan of ordinary weeks of seven days; yet they celebrated a feast every thirty years, when the first day of the civil year (which was always 365 days) showed an increased difference of seven days from the sacred year, which was a corrected one; and we are told in Gen. 1, 3, that the Egyptians mourned for Jacob seventy days.

But it is among the Hebrews that the prominence of the number seven (spiritually signifying rest or completeness) is most conspicuous.

The calendar of the three great annual feasts and also other periods is arranged on this plan, for instance—

The seventh day is the Sabbath (Ex. xx, 8, 9, 10).

The seventh week from the morrow of the Sabbath after the passover was the feast of weeks (Lev. xxiii, 16).

The seventh month from the passover was the feast of tabernacles (in-gathering) (Lev. xxiii, 34).

The seventh year was the year of release (Ex. xxiii, 11).

After seven times seven years was the year of Jubilee (Lev. xxv, 8, 9).

Seventy years was the period of the captivity (Jer. xxv, 11), and of the age of man (Ps. xc, 10).

Seventy weeks or seventy periods of seven years each was the period prophesied by Daniel (Dan. ix, 24).

And there may be other longer septiform periods.

*Feasts.*—With regard to the three great annual feasts of Jehovah mentioned above, viz., Passover, Weeks, and Tabernacles, it is interesting to notice the time of the year and of the month in which they were placed. The first and the last were in the middle of the month at the full moons near the equinoxes, and the intermediate feast was at about the beginning of May, when the moon was at or near the beginning of its second quarter. Thus on the first days of two of the feasts there would be the light of full moon all night, and at the other one, a fair amount of moonlight for the first part of the shortened night of early summer.

Thus a maximum amount of nocturnal illumination was obtained in the first days of the feasts, consistent with the

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\* See p. 106, vol. ii, *Prim. Constellations*, by A. Brown.



carrying out of the septiform arrangement: this must have added to the splendours of the feasts, and it must have had a practical advantage in the avoidance of confusion,\* as we remember that all the males were ordered to appear before the Lord on these three occasions (Ex. xxiii, 17). It is observable that there was no feast at Midsummer, when the great heathen orgies of Tammuz, and sun worship generally, were celebrated by the neighbouring heathen.

The feast of the Passover was the foundation day of Hebrew Deliverance (Ex. xii, 27), and Christ our Passover (1 Cor. v, 7) also died on the same day (Mark xv, 42).

The feast of Weeks or first fruits was the day of the giving of the law† (Ex. xix, 1, 10, 11), and also of the descent of the Holy Spirit (Acts ii, 1, 2).

The great feature of the feast of Tabernacles was rejoicing (Lev. xxiii, 40; Deut. xvi, 15 R.V. "altogether joyful") at ingathering. When the Hebrew nation had reached the summit of its glory, Solomon's temple was dedicated on that day (1 Kings viii, 2), and the people were sent away "joyful and glad of heart" (1 Kings viii, 66). There is also to be a future glorious keeping of this same feast at Jerusalem (Zech. xiv, 16), and it is also typical of the future day of great joy in store for the Christian (1 Pet. iv, 13).

Under some circumstances the Passover was allowed to be kept on the corresponding days of the second month, instead of the first (Num. ix, 10, 11; 11 Chr. xxx, 2); but Jeroboam was severely blamed for setting up a rival feast on the eighth month instead of the seventh, a date which "he had devised of his own heart" (1 Kings xii, 32, 33).

In Ezekiel xlv, 21, 25, the feasts of Passover and Tabernacles are alluded to, but not that of Weeks; and generally there is more frequent mention of the first and last feasts than of the intermediate one. The prominence of two of the feasts over the other is expressed astronomically by their occurrence at the definite periods of the equinoctial full moons, while the other feast was at a time of no special astronomical importance. As the fronts of the tabernacle and of the temple faced to the

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\* A volunteer friend tells me that another volunteer, who was in the habit of attending Easter manœuvres, and whose power of observation exceeded his information, once said to him, "How remarkable it is I always find a full moon for this outing! the moonlight at night is very convenient in camp life."

† See p. 48, *The Portable Commentary*, Rev. R. Jamieson, D.D.

East, the rising sun would be almost directly in front at two of the feasts, but not at the other.

The daily sacrifices were at sunrise (II Kings iii, 20, 22) and sunset. Noon was also a stated time of prayer for some (Ps. lv, 17).

*An Ancient Calendar.*—A year containing twelve months of thirty days each is alluded to in Gen. vii, 11, 24; viii, 3, 4, 13, as it was 150 days from the seventeenth day of the second month to the seventeenth day of the seventh month. There must have been twelve of these months, because a period of *at least*  $40 + 7 + 7 = 54$  days elapsed between the first day of the tenth month of the first year, and the first day of the first month of the following one (see Gen. viii, 5, 6, 10, 11, 12). It is believed that there were not any additional intercalary days.

If the word "time" is taken to represent a year, and "times" two years; the periods "time, times and a half" (Dan. xii, 7), "forty and two months" (Rev. xi, 2), and "1260 days" (Rev. xi, 3, xii, 6) are identical, each representing three and a half of such years.

The so-called Egyptian "vague year" of 360 days was of the same construction; it is believed to have been in use till about 2,000 B.C., when the five epact days were added to each year. A similar year was probably known to the ancient Babylonians.

When the sun and moon are both used, as in the Hebrew Calendar, it becomes necessary to have some means of foretelling the vernal lunation which is to contain the passover, or what comes to the same thing, to determine beforehand which years shall contain an extra lunation: this led to a search for astronomical cycles, *i.e.*, periods when different celestial revolutions are performed in almost the same time. Meton, about B.C. 432, found, from the result of careful observations, that 235 lunations only exceed 19 years by about 2 hours 10 minutes; in other words, after a cycle of 19 years the new and full moons recurred on the same days of the year, and this happens again and again. This is a convenient cycle, the Jewish reckoning for the passover and our golden numbers in the Book of Common Prayer for finding Easter being founded upon it. It must be noted, however, that after eleven such cycles (209 years) have elapsed, that the  $2\frac{1}{2}$  hour differences add together, and amount to 24 hours; consequently after every 209 years a correction of one day must be made.

De Cheseaux, a Swiss astronomer, who lived in the middle of the eighteenth century, was searching for other such cycles, and found that the number 1260 (Rev. xi, 3, and xii, 6), and also 2300 (Dan. viii, 14) gave excellent cycles when taken as *years*, each having a small error in the same direction. He therefore expected and found that their *difference* 1040 would be more correct still. In recent years Dr. Grattan Guinness has taken advantage of this cycle to construct tables giving the times directly of all new moons for a period of over 5,000 years; this has been certified, by competent astronomical authorities, to be in very close accord with the results of long and careful computations: for the practical purpose of chronology the two methods may be said to give identical results.

This cycle was apparently not understood by the writer Dan. viii, 15: it was only discovered by a comparison of Bible numbers.

The assumption that the 1260 and 2300 *days* in the text in the Bible, may be regarded as *years*, is based upon the two passages, Numb. xiv, 34, "searched out the land . . . each day for a year," and Ezek. iv, 6, "I have appointed each day for a year."

#### (4) DIRECTION AND ORIENTATION.

*The points of the Compass.*—We have already noted that in Old Testament times observations were generally made of the risings of the sun and stars on the visible horizon; we can therefore readily understand why the East was regarded as the front; the West was consequently behind; the North was on the left; and the South on the right.\* It may be assumed that when the words front or before, hinder, left, right, are used with respect to a fixed object such as a building, town or country, that East, West, North, South respectively are intended. Our versions do not always carry this out, as will be seen from the appended table, which refers to our own authorised and revised versions, and also to French and Spanish

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\* The same arrangement is observable in Sanscrit and in some at least of the Indian languages (*e.g.*, Bengali and Marathi) derived from it. In modern Arabic the same rule also obtains, though in some places one or more of the terms have become obsolete and other expressions are now used instead.

Yemen in Arabia and the Deccan in India both owe their names to this arrangement, and both mean "the south country," literally "the right hand," in Arabic and in Sanscrit respectively.



French (D'Ostervald).	Spanish (Cip. de Valera).
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ones. If the literal rendering were always given, and if a short explanation were made at the beginnings of all Bibles of the ancient way of regarding the East as the front, every reader would be able to judge for himself from the context when front, left, etc., meant East, North, etc., and several marginal readings might be avoided. It would then be clear that Solomon's temple was oriented like the Tabernacle in the wilderness (Ex. xxvi, 22; 1 Kings vi, 16, R.V.).

At the present time we in England employ a somewhat similar plan in topography; we speak of the right or left bank of a river, and we give a clear impression of our meaning to anyone familiar with the conventional plan, that the right bank is that on the right hand of anyone looking down stream. It is somewhat remarkable that we now look *down* the course of the stream, but the ancient Hebrews looked *towards* the course of the Sun, and many modern Easterns do the same.

In this connection Job xxiii, 8, 9, R.V., calls for attention:

"Behold, I go forward, but He is not there;  
And backward, but I cannot perceive Him;  
On the left hand, where he doth work, but I cannot behold Him,  
He hideth Himself on the right hand that I cannot see Him."

The cardinal points are almost certainly intended in this passage, and they are so rendered in both French and Spanish, but not in either our A.V. or Revised Versions. The mention of hiding Himself on the right hand probably refers to the hiding of His works, *i.e.*, the stars, in the south, a fact also alluded to in the expression, "Chambers of the South," in Job ix, 9, when again the full meaning appears to have been missed by our translators in both versions, but recognised by both the French and Spanish, as they correctly give "*chambres cachées*" and "*lugares secretos*" as the meaning of the word which we render simply "chambers."\* The hiding of the stars below the horizon in the south must have been noticed by travellers in Bible times, specially by voyagers on the Nile, which stretches north and south through many degrees of latitude. A description of the south as a place where stars

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\* In Sanscrit the Rev. A. Margöschis states that *avāci*, meaning "lower region," is a word used to express the South. The Rev. A. Elwin, late missionary in China, states that in Chinese, South, is "below." The Rev. W. C. Whiteside, Western India, says that South is sometimes described in Sanscrit as "the door." South is also called *yāmayā* in Sanscrit from *yāma*, the God of death. The connection between the hidden chamber and the dead seems to be obvious from Gen. xxiii, 4 and 8, "Bury my dead out of my sight."

are hidden from one stationed in northern latitudes is a very natural one; I myself well remember being struck with a full view of the brilliant star Canopus high in the heavens, when in more southern latitudes. This star is of course never visible to us in England, being hidden from view below the horizon in the south. The "working" on the left or north in Job xxiii, 9, may refer to the revolving of the stars round the pole.

That the passage most probably indicates the points of the compass seems evident from the context: Job is desirous to discover Jehovah, "Oh that I knew where I might find Him," he says just before in verse 3, and then in the text under consideration he says in effect, "though I go to the sun rising, He is not there, to the sunset but I cannot perceive Him; to the mysterious north stretched over empty space (Job xxvi, 7), round which the constellations revolve, but I cannot behold Him; he hideth Himself if I journey southward and gaze on the stars hidden from us here, even there I cannot see *Himself*." Then by way of sharp contrast he adds in verse 10, "but *He* knoweth the way that *I* take." In Job ix, 7-11, the same thought of Jehovah's power over the sun and stars and of Job's inability to see the maker Himself "which doeth great things past finding out, yea, marvellous things without number," is expressed in somewhat similar language: "So He goeth by me and I see Him not: He passeth on also, but I perceive Him not." Modern Science notes some of the marvellous things, but utterly fails to find the Maker Himself.

In Job xxvi, 7, R.V., the description of the north as stretched over empty space, seems to accord with the idea in the modern Arabic word for north, which means "void" (Rev. W. G. Pope), and with the Tibetan chang "clean," or "purified" (Colonel Waddell); perhaps our own word north may mean no (sun) or void (of the sun).

The east sometimes in the Bible means a country in that direction; as the west is spoken of as behind or hinder; and as the Mediterranean Sea (which was essentially *the* sea) was on that side of Palestine, the word for sea often signifies west,\* and it is consequently translated "west" no fewer than 69 times; as this was so often done, it would appear that in Ps. cxxxix, 9, "If I take the wings of the morning, and dwell in the uttermost part of the sea," that the word "west" in

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\* Mr. G. Michell of Casa Blanca on the Atlantic coast of Morocco states that the Arabic word for sea, signifies "west" there at the present time.

English would probably convey the meaning intended much better than the word "sea." The contrast between the brightness of the morning in the east, and the figure of extreme darkness in uttermost west seems intelligible, more particularly as the passage goes on to say that darkness cannot hide from God. The employment of the word "sea" in English destroys this sequence of ideas. All the four versions, however, use the word "sea," and none of them even gives a marginal note that the "west" might be intended. It is somewhat remarkable that the word "Yam," the sea, so often translated "west," is once rendered by the word "south" in the text of both A.V. and R.V. (Ps. cvii, 3).

The Negeb, the dry hilly southern part of Judaea, is always translated the south or south country; in one case in the R.V. (Gen. xiii, 1) it would appear better to have used the name of the country instead of the expression "the south," as Abraham did *not* go in a southward direction, when he went from Egypt to the Negeb.

There is apparently no trace in the New Testament that the east was regarded as the front, and that the other cardinal points were grouped in relation to it; on the contrary, it seems that the modern European idea of the vertical plane of the meridian being considered the fundamental one had arisen and prevailed, for the word *mesēmbria*, which originally meant mid-day, also signifies south, and it is so translated in the text of Acts viii, 26, of both our A.V. and R.V. As the same double meaning is attached to the French and Spanish words "midi" and "mediodia," and as both their versions give only "south" in the passage under consideration, the marginal reading "or at noon" in our R.V. may be unnecessary.

It is interesting to note that the Latin *meridies*, from which the French and Spanish words are both derived, has entirely lost its meaning of "noon" on entering the English language, since our word "meridian" only signifies direction.

*Orientation.*—In the earlier books of the Bible, the points of the compass are very often alluded to, as for instance in the description of the orientation of the Tabernacle, and of the position of the tribes around it in the wilderness, and in agreement with this modern research tells us that ancient temples were generally carefully placed in directions indicated astronomically.

*Tabernacle compared with Heathen Temples.*—Comparing an ordinary heathen, Egyptian, or Greek temple with the tabernacle in the wilderness, we find a general agreement in the



following points ; they were each oriented, rectangular in plan, symmetrical on either side of a central line, and provided with an inner sanctuary and with rows of pillars. But when we come to the arrangement of the pillars we find a vital difference.

We have seen that in heathen temples dedicated to astronomical deities, a clear course is allowed down the centre from the entrance to allow the light of the rising sun or star to shine into the inmost holy recesses. This necessitates an even number of pillars on the front, as may be seen at St. Paul's in London, St. Peter's in Rome, etc., which are copied from the antique. It may perhaps be said that beauty of appearance also demands a central entrance. It is consequently remarkable that the number of pillars in front of the tabernacle was odd ; while the number placed between the holy place and the most holy was even\* (Ex. xxvi, 32, 37 ; xxxvi, 36, 38 ; see fig. 2).

The glory of the Lord was *within* the most holy place of the Tabernacle and of the Temple (Ex. xl, 35 ; II Chron. vii, 2 ; see also Rev. xxi, 23, xxii, 5), consequently there was no need to make arrangements for light to come in from outside. Even had the veil been lifted and the strict orders against entrance into the most holy place been relaxed, the odd central pillar would have prevented the light of the rising sun from entering effectively ; may we not therefore look upon this central pillar as a protest against the worship of the heavenly host ?

Solomon's temple was the direct successor to the Tabernacle, and we find several of the dimensions of the one simply doubled in the other (Ex. xxvi, 16, 18, 22 ; I Kings vi, 2, 20) thus :—

		Length.	Breadth.	Height of Most Holy Place.
Tabernacle	...	30 cubits.	10 cubits.	10 cubits.
Temple	... ..	60 "	20 "	20 "

\* It has been said by some, that the central pillar was necessary, in order to carry one end of a ridge pole (which, however, is not mentioned in the Bible). But even if this were so, the light of the rising sun would have still been obstructed ; it would not have been difficult to have carried the ridge pole (if it existed) on a short cross piece supported on two pillars, if an unobstructed central space had been desired.

The four pillars between the holy and most holy places in the Tabernacle gave five openings: these were replaced in the Temple by one opening (central by symmetry), one-fifth of the whole, furnished with doors or doorways; two-fifths of the front on each side were presumably boarded up (1 Kings vi, 31-34).

The five pillars on the front giving entrance to the holy place in the Tabernacle from the outside gave six openings; these were replaced in the temple by two openings, each furnished with doors, which symmetry demanded should be on each side of a central pillar; each of these doorways occupied one-eighth of the front. Had these doors followed exactly the same rule as the other doors leading into the most holy place they would each have been one-sixth of the front; but the increase of actual frontage over that of the Tabernacle permitted the proportionate width of the doorways to be reduced; thus though *some* change was made, the central pillar arrangement which blocked the entrance of the sun's rays apparently remained unaltered. This seems evident from the marginal reading of the A.V., but the R.V. does not make this meaning quite so clear.

The description of the Temple in Ezek. xli, 2, 3, is rather obscure; but it would appear probable that the entrance to the holy place was in two parts, "five cubits on the one side, and five cubits on the other side," *i.e.*, two doorways with a central post between them. The entrance to the most holy place was apparently only one opening, as there is no mention of "in the one side" and "on the other side."

*Direction.*—The Hebrews were not a maritime nation, and we find little allusion to the use of the heavenly bodies for the purposes of navigation: we may, however, notice two passages (Job xxxviii, 32, R.V.), "Canst thou guide the Bear with her train." (The Arcturus of this passage and of Job ix, 9, in the A.V. is evidently a mistranslation.) The constellation of the Bear was in those days much nearer to the pole than now, and it consequently must have served to point out the then pole star quite as effectively as it now does the present one; the thought seems to be "are you able to guide that which guides the mariner"? In Acts xxvii, 20, R.V., "when neither sun nor stars shone upon us for many days," the thought seems to be that the danger was great because the means of guidance was not available; had it been intended to say that their hiding indicated cloudy bad weather, we should expect to find the moon mentioned also; but mention of the moon is probably

omitted because it could hardly have been of use for purposes of navigation.

### (5) THE HEAVENS.

From a remote period it has been found convenient to divide the heavens into three regions, viz., those containing :—

1. Circumpolar, non-setting stars.
2. All other visible stars, *i.e.*, those rising and setting.
3. All remaining stars hidden under the horizon in the south.

Job ix, 9, R.V., mentions “the Bear, Orion and the Pleiades and the chambers of the South,” and thus enumerates all these regions; (1) The very conspicuous constellation of the Bear was then non-setting in those latitudes, and consequently represented the rest of the non-setting stars; (2) Orion and the Pleiades, the rising and setting stars; and (3) the (hidden) chambers of the South contained the remainder.

(1) *Non-setting stars*.—Some of the non-setting stars had a practical value in giving direction, as we have already noted: if proper allowance is made for the time of year, the constellation of the Great Bear, or the Great Clock of the North, as it has been called, gives the time at night with considerable accuracy, especially if a dial face, anciently called a “nocturnal,” is placed over it and the pole star. The non-setting stars collectively typified the evil powers of darkness, which were only vanquished by the rising of the sun. The old story was that Merodach had a fearful conflict with the dragon. This was poetically pictured in the heavens by the constellation Draco, one of whose stars, towards the tail, was the pole star of some 4,500 years ago; the body of Draco was consequently apparently transfixed by an invisible spear (the axis of the earth produced), and the two parts of the creature revolved around it, giving the idea of twistings about in agony. The rising of the sun caused its entire disappearance, and so apparently completed its destruction. Our figure of St. George and the Dragon on the British sovereign possibly owes its origin to the first part of this ancient story. “His hand hath pierced the swift serpent” (Job xxvi, 13), probably has an astronomical reference and indicates that Jehovah causes the constellation Draco to revolve, and consequently all the other stars as well; it may perhaps also refer in poetic language to His supreme power in overcoming all evil.

The seeming destruction of the stars caused by the rising

sun was an ancient figure of speech, and it is probably used in II Thess. ii, 8, R.V., "That wicked . . . whom the Lord . . . shall bring to nought (katargēsei) with the manifestation of His coming." In Nahum iii, 16, 17, "the stars . . . when the sun ariseth they flee away," bears out the same idea—if it is allowable for the verb to refer to the stars as well as to the locusts—and both refer to the great men of Nineveh. "He must increase but I must decrease" (John iii, 30), may be derived from a similar idea, as the morning star, herald of the dawn, modestly decreases very much, but (at its brightest) does not disappear altogether, on the rising of the orb of day. John the Baptist may perhaps here be likened to the morning star,\* as "he was not that Light, but was sent to bear witness of that Light" (John i, 8; see also Mal. iii and iv, 2).

At the beginning of the Lord's ministry, which was probably in the autumn, John twice repeats the sentence almost in the same words (John i, 15 and 30, R.V.), "After me cometh a man that is become before me, for he was before me," a phrase quite in accord with the figure of the morning star and the sun.

In John v, 35, R.V., the Lord speaks of the Baptist as "the lamp that burneth and shineth: and ye were willing to rejoice for a season in his light." The name for Venus of "Light" or "Lamp" is no uncommon one. With regard to the phrase "rejoicing in his light," an Egyptian, Atallah Athanasius (associated with Dr. Harper of Cairo), states that "travellers by night when they see the morning star rejoice exceedingly, and sing special songs in its honour, calling it 'the release,' because it announces that the troubles of night and its darkness are coming to an end."

If, as is probable, John made his comparison (John i, 15, 30) and the Lord made His comparison (John v, 35) to the morning star at times when it was distinctly visible towards the end of each night, we have a probable indication of the exact date of the Crucifixion, which is generally believed to have occurred within the dates 29 and 33 A.D.

Mr. Wickham, Senior Assistant, Radcliffe Observatory, Oxford, has calculated for me that the planet Venus was at its brightest as the morning star about 10th July, 28 A.D., and again about 14th February, 30 A.D. new style, or 27th June, 28 A.D., and 1st February, 29 A.D., old style (for the old style year began on the 25th March); this involves its shining as the morning star for about three weeks before and two or three

\* See *Ministry Gospel Treasury*, section xiii, part ii, p. 132.

months after those dates, *i.e.*, in the autumn of 28 A.D. and in the spring of 30 A.D. The former of these periods may well have contained the commencement of the Lord's ministry, and the latter the second passover, which is generally thought to be indicated in John v, 1. As the Crucifixion was at the fourth passover, its date would thus be 32 A.D. or 29 A.D. It must be confessed that this is not strong evidence but only a possible inference.

The planet Venus as morning star is much better known by Eastern peoples at the present time than by us. Some farmers in India and others in the East notice its appearance in broad daylight. We may think a figure derived from the planet as far-fetched, but it was doubtless very familiar to the ancient Jews.

(2) *The rising and setting stars.*—The second region contains the rising and setting stars; practical use was made of them because when some of them rose with or just before the sun, the seasons of the year for various agricultural operations were indicated. According to Dr. Takakusu, Professor of Sanscrit, Tokio, the farmers of parts of China and Japan, where almanacs are not so plentiful as with us, still make use of them for these purposes. Some 600 B.C. Hesiod wrote of the Pleiades, "begin harvesting at their heliacal risings, but plowing when they set."\*

The practical value of the Pleiades to the farmer due to its position in the heavens probably explains the references to the cluster in Job ix, 9, xxxviii, 31, and Amos v, 8, R.V. Orion, the most brilliant of the constellations, is also mentioned in the same three passages, probably as representing all the rest. In Is. xiii, 10, the same Hebrew word is used, but it is there translated "constellations" instead of Orions in both our A.V. and R.V.

This second region of the heavens contains the band of stars called the Signs of the Zodiac, which is described as the tabernacle of the sun (Ps. xix, 4). The signs of the zodiac are surely referred to in II Kings xxiii, 5, and in Job xxxviii, 32, as is indicated in the marginal readings of both A.V. and R.V. The texts of both the versions, however, are not helpful, the Hebrew word Mazzaroth or Mazzaloth only occurs in these two places, but is translated "planets" in one case, and simply Mazzaroth is given us in the other. No doubt, apparently,

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\* Agricultural operations in Egypt and Persia are still regulated by the heliacal risings.

entered the minds of either the French or Spanish translators, as both have given the meaning as the signs of zodiac in both places; this seems quite consistent with the context of Job xxxviii, 32, R.V.: "Canst thou lead forth the Mazzaroth in their season?" as the leading forth of the signs of the zodiac with respect to the sun influences the seasons.

(3) *Hidden Southern Stars*.—The third region of hidden southern stars calls for no further note: when discovered by one journeying south, they naturally linked themselves to the other rising and setting stars.

Job xxxviii, 31, 32, R.V.: "Canst thou bind the cluster of the Pleiades, or loose the bands of Orion? Canst thou lead forth the Mazzaroth in their season? or canst thou guide the Bear with her train?" enumerates what may be called the useful visible constellations; Pleiades and Orion indicated the time for agricultural operations; the signs of the zodiac the sequence the seasons; and the Bear was the guide to the mariner.

#### (6) GRAND ASTRONOMICAL STATEMENTS.

In ordinary ancient astronomy there were various theories about the shape of the earth and the method of its support; in the Scriptures we have the simple statements, "the pillars of the earth are the Lord's, and He hath set the world upon them" (1 Sam. ii, 8, see also Job xxxviii, 4, Ps. lxxv, 3, Prov. viii, 29), and "He hangeth the earth upon nothing" (Job xxvi, 7). The globular form of the earth is thought by many to have been unknown to the ancients: but it appears that (Is. xl, 22) He "sitteth upon the circle of the earth" of both our Authorized and Revised Versions would be more accurately translated, He "sitteth upon the globe of the earth." Both the French and Spanish agree in translating the Hebrew word "khug" as "globe."

The globular form of the earth is also inferred from the Lord's statement that at His sudden coming (Luke xvii, 24), some will be in bed, presumably at night (Luke xvii, 34), while others will be working at their ordinary occupations (Luke xvii, 35, Matt. xxiv, 40, 43), presumably in the day-time. Day and night at the same instant at different parts of the earth are quite consistent with its spherical shape.

According to the observations of modern astronomers, there are less than 6,000 stars in all the heavens visible to the unaided human eye. In the Scripture, however, they are repeatedly spoken of as very numerous indeed, and in some

cases their numbers are mentioned in conjunction with the sand upon the sea shore innumerable; now 6,000 grains of sand do not fill a very large space, and the linking together of these two examples of large numbers might not have appeared very apt to the first hearers. (Gen. xv, 5; xxvi, 4; Deut. i, 10, x, 22, xxviii, 62; Jer. xxxiii, 22; Nahum iii, 16; Heb. xi, 12). But when telescopes were invented, the numbers which could be seen rapidly grew to hundreds of thousands, and of late years to millions; and when photography came to the aid of astronomy, pictures appeared of other stars (never even yet seen by human eye in the most powerful telescope), and the totals now reach hundreds of millions. Of late years the spectroscope has confirmed what was previously only a suspicion, that many bright stars have other dark ones revolving with them. Sir Robert Ball tells us that "the brilliant objects that we see, though they are overwhelmingly numerous, yet they must be absolutely as nothing in comparison with the myriads of dark objects which are totally invisible to us, except when certain very remarkable circumstances occur." Thus our modern Science humbles us by showing that it is more difficult than it appeared at the time to comply with the demand, "tell the stars, if thou be able to tell them" (Gen. xv, 5). And it enables us to see a fuller meaning in the grand and simple statement, "He telleth the number of the stars" (Ps. cxlvii, 4).

The lately recognised dark stars of the modern astronomer may perhaps be referred to in Jude 13.

Except that a few of them were used for the practical purposes of finding the time and the latitude, the bulk of the stars were not of much interest to scientific astronomers a few years ago; though of course different magnitudes were assigned to them, and differences of colour were observed, some were noted as double and others as variable in their light. But now-a-days, with the aid of the spectroscope, it is found that all are moving with great and diverse rapidity; some are one thousand times as brilliant as our sun, while others are less so. Instead of the old apparent monotony among the stars, Professor S. Newcomb now writes: "Most remarkable is the diversity of their actual luminosities or the amount of heat and light which they individually emit. The whole tendency of recent research is to accentuate this diversity." Thus now-a-days, thanks to recent science, we can see more force than formerly in the words of Scripture, "one star differeth from another star in glory" (1 Cor. xv, 41), and our present knowledge of the

immensity of stellar distances greatly adds point to the words of Eliphaz, "Behold the height of the stars, how high they are" (Job xxii, 12).

#### (7) FIGURATIVE ALLUSIONS.

When the human race was a few thousand years younger than it is at present, sunrise was pre-eminently the type of increasing power; but we modern English in our northern latitudes have a very early daybreak in the summer time when the weather is fine and clear, and our present habits of late rising prevent most of us from being astir at that time of day; in our winter the skies are frequently cloudy and dull, and the glories of sunrise are veiled; the consequence is that we have little practical experience of the beauties of daybreak, and so the Bible accounts of it do not come with so much force to us as to those who lived in more southern countries, and frequently witnessed it. There are still, however, two powerful eastern nations, Persia and Japan, which employ the symbol of the rising sun as their national emblem. In the Scriptures abundant use is made of sunrise as a figure of strength and joy: the sun is said "to rejoice as a strong man to run a race" (Ps. xix, 5). Other joyful references to it are, "The day spring from on high hath visited us" (Luke i, 78). "The path of the righteous is as the light of dawn, that shineth more and more unto the perfect day" (Prov. iv, 18, R.V. marg.). "Then shall thy light break forth as the morning" (Is. lviii, 8).

On the other hand, the withdrawal of the light of the sun, and also of that of the moon and stars, is an emblem of sorrow: "The sun and the moon are darkened and the stars withdraw their shining" (Joel iii, 15). Intensity of sorrow is shown by an unexpected quenching of the grateful light of day. "Her sun is gone down while it is yet day" (Jer. xv, 9). In the same strain a period of lasting joy after sorrow is spoken of as a time when "Thy sun shall no more go down . . . the days of thy mourning shall be ended" (Is. lx, 20).

In this connection it is interesting to note the text, "Until the day dawn, and the shadows flee away" (Song of Solomon, ii, 17, and iv, 6, A.V.), which certainly gives the idea of dawn, and it has consequently been taken as a type of resurrection. The words "be cool" in R.V., however, make it appear that evening is the time intended: according to Professor Margoliouth, the word used for "fleeing away" refers to odours diffusing themselves, and one would think might as well refer to the



shadows disseminating themselves over the earth at night as to their disappearance altogether in the morning; the word translated "break" in A.V. and "be cool" in R.V. is difficult. On the whole the probability seems that the evening is intended, the context is certainly not opposed to that view, and the movement of shadows in other parts of Scripture seems generally to refer to evening (Job vii, 2; Ps. cii, 11, cix, 23).

It must have been no uncommon sight to see a few flat clouds or mist low on the horizon at dawn, in the Eastern sky in Bible lands in Bible times, and when the sun rose, they must have caught some of its radiance, almost appearing to be a part of the luminary itself; a very natural poetic idea would call them wings to assist its upward flight.

In Mal. iv, 2, we are told, "Unto you that fear my name shall the Sun of righteousness arise with healing in His wings." And in Ps. cxxxix, 9, the wings are also associated with the rising sun, for the expression is "wings of the morning."

This thought seems to be carried out in the numerous carved images of the solar disc with long lateral wings (emblems of divinity, see Fig. 1) so often to be seen in ancient temples, etc. (probably the tails of some of them represented the downward rays of the sun sometimes to be seen when it is near the horizon); the differences in design in Egyptian and in Assyrian winged suns may be due not only to differences in the national art of the two countries, but also to the differences in the morning cloudscapes of rainless Egypt and of the more clouded sky of the country near the hills to the north of Assyria. Compare A and B with E and F, Fig. 1. The winged solar discs, emblems of divinity, are not improbably the sun images forbidden to the Hebrews (Lev. vi, 30, etc.). Let us not be alarmed at this coincidence; Scripture allows and uses the language of imagery in worship; but it forbids the construction of the actual images themselves for the purposes of worship.

Another symbolic meaning of wings was to signify care or protection (Ps. xvii, 8, lvii, 1; Mal. iv, 2; Matt. xxiii, 37); this thought may possibly explain Ps. lxxxiv, 11, "The Lord God is a Sun and Shield." The sun symbolises His active power and the wings His shielding care of His people.

It is doubtful whether the moon, which reflects the sun's light to the dark world, is "the faithful witness" of Ps. lxxxix, 37, or whether the rainbow is intended.

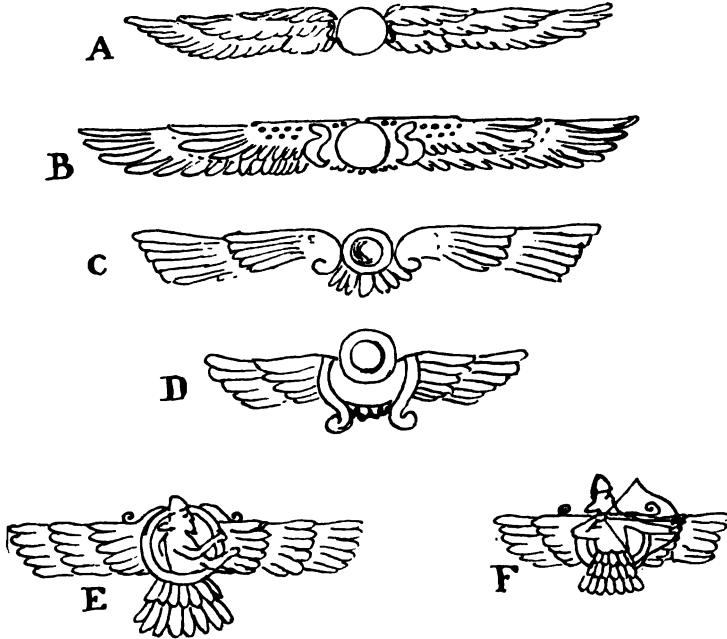
The infinitudes of space grandly picture the infinite majesty

and grace of Jehovah, "As the heavens are higher than the earth, so are my ways higher than your ways and my thoughts than your thoughts" (Isa. lv, 9). A similar beautiful comparison is also employed in the following double couplet:

"As the heaven is high above the earth,  
 So great is His mercy towards them that fear Him.  
 As far as the East is from the West,  
 So far hath He removed our transgressions from us."  
 Ps. ciii, 11, 12.

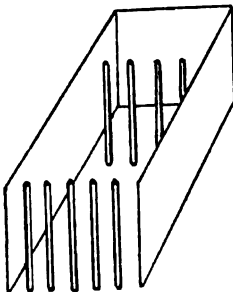
**FIG. 1.**

**WINGED SOLAR DISCS.**



**FIG. 2.**

**THE TABERNACLE.**



In Fig 1  
A and B are  
**EGYPTIAN**

from the British Museum.

A about 1300 B.C.

B . . . 1300 B.C.

C and D are  
**HITTITE**

from *History of Art in Syria &c.*  
Perrot and Chipiez.

E and F are  
**ASSYRIAN**

from the British Museum  
both about 800 B.C.

# APPENDIX.

## EXPLANATION OF CHANGES OF AMPLITUDE OF THE RISINGS OF STARS.

If a top (Fig. I) is spun and slightly tilted over, it will perform a number of slow gyrations, and the highest point will slowly describe a horizontal circle (shown by the dotted line) round a centre E, which is vertically above the lowest point.

Take a precessional globe (Fig. II), which has around it a vertical brass circle: another brass circle revolves inside it on an axis of which N is one of the pivots; and an ordinary celestial globe is pivoted inside this circle, E being one of its pivots. EN subtends about  $23\frac{1}{2}^{\circ}$  at the centre C of the globe.

One revolution of the globe inside the inner circle corresponds to the slow precessional gyration of the earth, which is only completed in about 26,000 years.

One revolution of the globe and inner circle *clamped together* corresponds to one revolution of the earth on its axis in twenty-four hours.

Clamp the globe and inner circle together so that N becomes the north pole (N being elevated about  $30^{\circ}$  to suit the latitude of Memphis in Egypt), it will then represent the heavens at the present time; the star (Arcturus) rising at P when revolution ensues.

Unclamp the globe, revolve it through  $62\frac{1}{4}^{\circ}$  and clamp it again to the inner circle, so that N' takes the place of N as the north pole; then the condition of things about 4500 years ago (B.C. 2596)

is represented, because  $\frac{62 \cdot 34}{360} = \frac{4500}{26000}$

Through N' runs the constellation Draco, and  $\alpha$  Draconis was then very near the pole, and was the pole star for a long period before and after that time; it will also be noticed that the constellation of the Great Bear was then nearer to the pole than it is now.

When revolution ensues the star (Arcturus) will rise at P' instead of P, for as N' has been moved to the right, the star must shift also, since N'P must equal NP'.

Thus the magnitude of the horizontal angle PCP' represents the change in amplitude in the rising of Arcturus at latitude  $30^{\circ}$  in that period of 4500 years, and the angle consequently is a measure of time. E and the dotted circles have the same meaning in both Figs. I and II.

This slow gyratory movement of the axis of the earth also causes the sun at the equinoxes to appear to move through the belt of stars called the signs of the zodiac, of which Aries is one; as the whole belt is arbitrarily divided into twelve equal parts or signs, the movement through each sign takes a twelfth part of 26,000 years, or about 2,166 years. This apparent movement of the equinoxes was known long ago, and consequently the gyration received the name, now established by long usage, "the precession of the equinoxes."

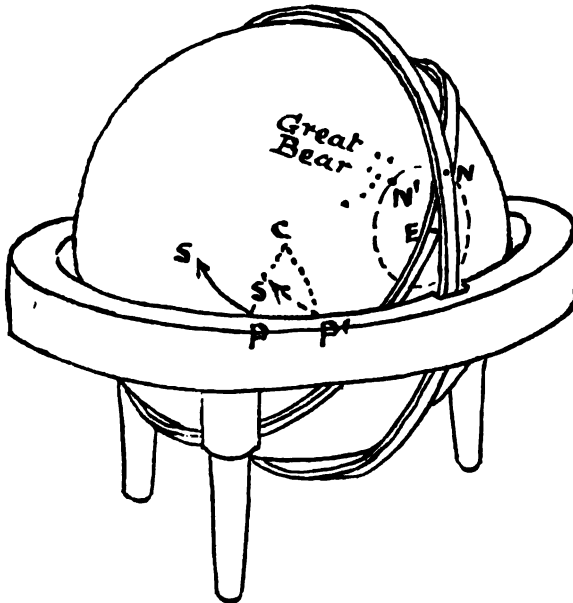
## APPENDIX.

FIG. I.



FIG. II.

PRECESSIONAL GLOBE.



## DISCUSSION.

The SECRETARY.—I should like to mention that the author of the paper, Lt.-Col. G. Mackinlay, is not unacquainted with practical astronomy, as he was second observer in the British expedition to make observations on the transit of Venus in 1882 in Jamaica, when he took independent observations. Dr. Copeland, the present Astronomer-Royal for Scotland, was the first observer. You will thus see that Colonel Mackinlay is well qualified to deal with the subject of Biblical Astronomy.

Mr. HARDING.—Mr. Chairman, ladies and gentlemen, I have been asked to give my testimony as to the astronomical ideas of the people of Palestine to-day, and more particularly of the Bedouins. After some years in contact with the Bedouins, I have come to the conclusion that their ideas are very vague indeed. They know the names of the signs of the zodiac, but I doubt whether they could point out the signs in the heavens. However, they can tell the time by the stars. When one has been travelling by night, and has asked them the time, looking around they would make a fairly good guess as to what the time of night was. During the day they certainly would tell the time by the sun, but they never could tell with any accuracy when the sun was more than halfway up from the horizon. They hold the hand at arm's length between the face and the sun, and show how many fingers the sun is from the horizon. But I have noticed and was struck by the regard that the Bedouin had for the morning star. I think that if that friend of Colonel Mackinlay's who doubted the possibility of rejoicing in the light of Venus had ever spent a night on the open desert, with its discomforts, he would rejoice in the light of the morning star. Always when a Bedouin comes into the tent before dawn the first thing he is asked is, "Has the star risen?" Just as a lazy British workman, we may say, turns over to his friend and says, "Is it six o'clock yet?" so the lazy Bedouin turns round and says, "Has the star risen?" I can fully corroborate what Atallah Athanasius has said about the travellers in Egypt rejoicing in the light of the morning star. On a night when there is no moon, the light of Venus

does make a decided difference. I have proved that when riding with one's back to the east, I have been able to tell that the star had risen by the difference in the light.

There are just two points in Colonel Mackinlay's paper that I should like to draw attention to with a view to getting a little information from any Hebrew scholars who may be present. In connection with the points of the compass, the Bedouins and the Arabic speaking peoples evidently originally fixed their points of the compass by the way they were looking, that is to say, to the east. The universal word for north in all Arab dialects is the word for left hand, and in certain parts the word for the right hand also indicates the south. In connection with this see the verse in the xxiii chapter of Job, quoted by the lecturer. It is extremely probable that the points of the compass are here indicated, and some versions (including modern Arabic) translate accordingly. But I should like the opinion of Hebrew scholars as to whether we should take the *south* as the place of hiding. I do not know very much about Hebrew, but it seems to me that the *north* is the place of hiding. The common word for north, *tsāphōn*, means *hidden*. It is strange that the same idea should be connected with the south. In the passage in Job ix, 9, we get two words both meaning south. We get *cheder* and *temān*; *temān* must mean the south; *cheder* is given by the lecturer as one of the words used for south, and it also means a secret place or chamber.

And then the second point was with reference to "yam," the sea, which usually means west. In this particular passage in Psalm cvii, 3, it is translated south. There is no doubt that it means south. How does it come to have this meaning? It is connected with the word north, *tsāphōn*, and the same collocation occurs in Isaiah xlix, 12, where our translators translate it north and west. But it struck me at once on looking at this, and I think it is an idea that is supported by some scholars, that the word "yam" here is really a contraction of "yamin," which is the ordinary word for south. Possibly as this is the only instance in which "yam" seems to mean south, that might be the explanation. One would like to hear what Hebrew scholars have to say about it.

Commander W. F. CABORNE, C.B., R.N.R.—While glad of the opportunity afforded me for saying a few words in appreciation of Colonel Mackinlay's thoughtful, valuable, and interesting paper, I

fear that the little attention I have hitherto paid to the subject of biblical astronomy will preclude my contributing much of value to its discussion.

However, with regard to certain miraculous astronomical events recorded in the Old Testament, and alluded to by the lecturer, it seems to me that if we accept as a fact that the planet upon which we live, and I am not going to enter into any controversy as to the opinions held by various scientists with respect to the earth's age or the manner of its formation, together with the sun, the moon and the vast myriads of other heavenly bodies pursuing their allotted courses through space, were created by the Supreme Spirit, whom we designate as God, then it is an equally simple matter to believe that the Great Architect of the Universe, in the exercise of His unfathomable wisdom and in the plenitude of His illimitable power, so temporarily dislocated or changed the working of the complex machinery which He himself had made, as to cause, without bringing about general destruction and chaos, the extraordinary astronomical phenomena which we are told, and know, have proved such stumbling blocks in the path of the faithful throughout subsequent ages of the world. To my mind, the two questions are indissoluble; if we accept the one we must accept the other, and if we reject the one we must reject the other.

Passing on; if, as the lecturer states, the astronomers of the present day are but little inclined to pay much attention to the scientific work of the ancients, the reason would seem to be intelligible. While those pioneers of astronomical science had certain glimmerings of the truth, that truth was more or less obscured and choked by erroneous matter; and with a vast field before them, which constant research is ever enlarging, modern observers may well be pardoned if they not unnaturally prefer to press forward rather than to look backward.

Nevertheless, it is not always safe to assume that the ancients were quite as ignorant as they are sometimes supposed and represented to have been. As an instance in point, I may mention that in the museum at Naples there is a case containing surgical instruments recovered from long buried Pompeii, and among those instruments is at least one which is identical with what is termed a modern invention.

Coming to the worship of the heavenly bodies by the ancients,



the Arabs before the time of Mohammed paid their devotions to the planets, stars, and various idols, but many of them at the same time, believed in one Supreme God the Creator and Governor of the Universe, and regarded their other deities rather in the light of intermediaries with the Almighty, and as subsidiary adjuncts of their religion. Mohammed sternly forbade the worship of all but one God, of whom he claimed to be the prophet, and in order to emphasise the absolute nothingness of the other objects of supplication, he, in the fifty-third chapter of the Koran, that sacred book of Islam so largely compiled from the Jewish Scriptures, declared that God is the Lord of the dog-star (Sirius), one of the celestial deities worshipped by the old Arabs.

The argument may be advanced that anything which obtained at the end of the sixth or the beginning of the seventh centuries of the Christian era had very little connection with systems current in Scriptural ages, but against this contention it may be urged that the East moves slowly, and that the same customs which existed at the commencement of the Hegira (which began July 16, A.D. 622) had probably obtained at least some centuries earlier.

As the Jews of old announced and celebrated the appearance of the new moon by the blowing of trumpets, and the Hindus in some places practice a similar observance, so the Mohammedans pay particular attention to the same manifestation. Those among us who have had experience of Eastern lands have witnessed the earnest anxiety exhibited for the appearance of the new moon which terminates the terribly severe fast of Ramadan and ushers in the feast of Bairam. Even the first appearance of the ordinary new moon is a cause of joy, and when a few years ago I was residing for a time in one of the protected native states (Bahawalpur) situated in the north-west of India, it was customary for the person who first sighted the Queen of Night, and reported her presence to the Nawab, to receive a present; then the members of the court tendered their felicitations to their ruler, and a salute of seventeen guns, the number allotted to his highness by the Government of India, was fired in honour of the auspicious occasion.

It is a difficult point to determine how far the ancient peoples were acquainted with the globular form of the earth. Personally, I am not competent to express any opinion as to the correctness, or otherwise, of translations; but with respect to the inference drawn

from our Lord's statement about what will happen at His sudden second coming, it is certain that He Himself, being Divine, was possessed of all knowledge, while His hearers, His disciples, who had not yet received the outpouring of the Holy Spirit, were anything but learned men.

According to Plutarch, Thales (sixth century B.C.) knew that the earth was a sphere, but it is now said that he looked upon it as being a flat disc ; Aximander, about the same period, thought that it was cylindrical in shape ; Pythagoras, a little later on, conceived it to be a sphere ; Hipparchus (second century B.C.), the discoverer of the precession of the equinoxes, was of opinion that it was flat ; while Ptolemy, some four centuries after him, held the view that it was sensibly spherical. Even at the commencement of the twentieth century there are people in England, possessed of some measure of education, who, notwithstanding overwhelming evidence to the contrary, maintain that our planet is flat.

Dr. HEYWARD SMITH.—I should like to draw attention to the constant recurrence in the paper of the expression "the Jews." On page 13, "when the Jewish nation had reached the summit of its glory, Solomon's temple was dedicated," etc. It is rather evasive, because we know the Jews were not called Jews until after. They were called Israel or Hebrews.

Mr. MARTIN ROUSE.—When Job used the words, "God stretches out the north over empty space and hangeth the earth upon nothing," it is clear that he did not believe that the earth was supported in some fabulous way—such, for example, as the Brahmins conceived, on the back of an elephant which stood on the back of a tortoise ; or, as the Grecians conceived, upon the shoulders of Atlas ; but he believed that in some wonderful way God held it poised without support in space.\* At the same time, the statement that He stretches out the north over empty space shows that the speaker knew that the earth was round—not necessarily globular, but certainly round ; because, if the earth were a square or oblong figure with northern, southern, eastern and western sides, the north would not have been stretched out over empty space, but would have been a long line of earth ;

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\* Therefore when the same speaker (in chap. ix, 6) said that God causes the pillars of the earth to tremble, he must have alluded in a poetic way to the inward supports of the earth's mighty crust.

whereas, if the earth is round, then of course the north is stretched over empty space, there being an imaginary line called north which touches the earth as a tangent of a circle at one point alone.

Respecting the Hebrew word *khug*, of whose employment in Isaiah xl, 22, Colonel Mackinlay has spoken, and which both our A.V. and R.V. there render "circle," the same word in Prov. viii, 27, is rendered by the A.V. "compass" and by the R.V. "circle," the full clause in the R.V. being "He sets a circle upon the face of the deep"; and it is plain that the circular horizon of the sea is intended. So, too, where in Job xxvi, 10, R.V., we read that He "described a boundary upon the face of the waters," the verb *khag*, translated "described," clearly means *drew a horizontal circle*. But in the passage before us, "It is he that sitteth upon the circle of the earth, and the inhabitants thereof are as grasshoppers," since God could have contemplated all men only from above, not a horizontal, but a vertical circle must have been signified—that is, a meridian circle from zenith to nadir, which can exist *only if the earth be a globe*.

I think with Colonel Mackinlay that, besides a figurative, spiritual meaning that the five pillars of the tabernacle entrance probably possessed, they were also designed to prevent the worship of the sun, while the fact which he has further brought to light, that Solomon's temple had also a central blank wall between two entrances, instead of the customary and majestic central doorway of temple or palace, confirms this view, for whereas the type (if it be a type) is changed, the same striking departures from custom is maintained.

Professor Ramsay has determined that the Saviour must have been crucified either in 28 or 29 A.D., and almost certainly in 29; and it is remarkable indeed, as Colonel Mackinlay has shown us, that when we take 29 as a date, and treat the morning star as alluded to in the figurative language used concerning John the Baptist (the forerunner of Christ, the Sun of Righteousness), the allusions all fit with the presence or absence and luminosity of Venus before the dawn. As regards the last recorded testimony of the Baptist (in John iii, 27–30), it must have been uttered between four and five months before the end of the year 27, when Venus was just beginning to be a morning star; for what called forth the testimony was the complaints of John's disciples that all men were going to Jesus instead of John for baptism; and the next thing recorded is that "therefore" when Jesus knew that this report had

reached the Pharisees, He withdraws into Galilee by way of Samaria, and during His few days' march through that province He is recorded to have incidentally observed that four months had still to elapse before harvest, or in other words before the passover (John iii, 26, and iv, 1, 35 ; cp. Jos. iii, 15, iv, 19, and v, 10, etc.).

The SECRETARY.—I should like to have an opportunity of referring to what I understood Captain Caborne to refer to when he spoke of the sun standing still, and the moon in the time of Joshua. It has been a great stumbling block to some believers in the Bible, arising entirely from us westerns forgetting that the poetical passages of the Scriptures which never were intended to be taken literally. Of course no man of science can believe that the Almighty brought the whole of this universe to a standstill in order to effect any purpose whatever. It is quite unthinkable ; but the whole thing is explained as a poetical quotation from the book of Jasher, "Is not this written in the book of Jasher, so the sun stood still and the moon over the valley ?" It is a poetical quotation from a work not in the Scriptures itself. I believe this explains the passage.

Colonel HENDLEY, C.I.E.—On page 124 Colonel Mackinlay speaks of the invariable orientation of the temples in the East. Some time ago I was asked by Sir Norman Lockyer to make some observations regarding the orientation of Indian temples. I found there was really no very definite rule at all, and the temple of the sun pointed to the north : it had nothing to do with the sunshine. The only important point seemed to be that the doorway of the temple should not point to the south or the region of the demons. However, Hindus do so far believe in the effect of the sun and moon on the images, that on certain nights the images are taken out and bathed in the moonlight. Very few people really realise the importance of astronomy and still more of astrology in the East. Almost every act of a native is foretold by the astrologer. His marriages are regulated by it, and a rich man will have his horoscope made up every year ; so that a friend of mine had one which was 30 feet long. When a coronation takes place it may be regulated by the sun. I was present at the coronation of the Desert King, the Maharajah of Jodhpur, and we waited until the sun rose above the horizon for a lucky moment, when the mark of investiture was made on his forehead.

Something was said in the paper about the Brahmans. Last night,

when an eclipse of the moon occurred, if we had been in India we should have found the populace blowing horns and beating drums to frighten away the demon who was swallowing the moon.

Everybody knows in India that the sun, moon, and different stars are supposed to be witnesses to any great event. So also one often sees near the temples a slab on which are carved figures of the sun and the moon, to bear eternal witness against anybody who dares to resume the land on which the temple was built. As regards the winged disc of the sun in India, it is very much easier than in more northern countries to see the sun rise. I have often ridden eight or nine miles before the sun rose, and have seen it rising with not unfrequently on either side of light white clouds which had the appearance of wings.

Professor ORCHARD.—I thank the author for this able and suggestive paper. I might express my own satisfaction that he has emphasized on page 127 the fact that certain astronomical facts were miracles, and in the next paragraph that the Bible records astronomical facts as they appeared to an ordinary observer. It would be perfectly absurd to speak the scientific language of the astronomer to people who do not understand the meaning of the terms. On page 132 the author has done well to remind us, in connection with the new moon and the Sabbaths of the Bible, that the Jewish arrangement of Sabbaths was not the same as that of the Babylonians. There are some people who imagine that it was, and that the Jewish arrangement was derived from the Babylonians. That is an error. It was not so derived, and both the Babylonian and Jewish arrangements were indicative of a primal revelation.

On page 145 the globular form of the earth is inferred from the statements of the xvii chapter of St. Luke and the xxiv chapter of St. Matthew. May I point out, however, that these statements carry more, that they prove the fact of the earth's rotation; since at one and the same time there is early dawn, full daylight, and night. That of course leads us to see that the earth must rotate.

I wish personally to thank the author for the pleasure and the profit which we have derived this evening.

Rev. W. F. CONNOR.—The word "yam" is the same both in Hebrew and Arabic, and it is used in colloquial Arabic with the idea of "at all" or immensity. You say you have not seen a person *at all*. The word for north is *tsāphōn*. I only know one word for north

and that was the left hand side. There are three words in Arabic for north.

Then there is another point, and it is with reference to the laws of the Jews contrary to the sun worship. We may see almost any Polish Jew with his curls hanging down at the side of his face, and the idea is that he was not to comb his head so as to make his face represent the disc of the sun. And with reference to the moon and moon worship, we have in Hebrew the word for the crossing line, which means bright and shining and also to rejoice, and at the present day we see, especially on the Continent, figures of the Blessed Virgin and Child standing in the crescent of the moon, and we can trace that back. We can look also at the Turkish sign with the crescent and the star, and we know that they got it from the Besantines, and we trace that back to the very oldest periods, the Hebrew times, among the Hittites. We see how great an influence the moon has exerted upon the religions of the world, and its trace has come down to us at the present day.

I have very greatly enjoyed hearing the paper which Colonel Mackinlay has read.

The thanks of the meeting were accorded to the author for his communication.

#### COMMUNICATIONS.

Rev. JOHN TUCKWELL, M.R.A.S., writes :—

Colonel Mackinlay has dealt with a very interesting subject. It was of course impossible for him to exhaust it. I may therefore be excused perhaps for making some little addition to it. I have often been struck with the remarkable scientific precision of our Lord's words recorded in Matt. xxiv and Luke xxi. Concerning His second coming He says, "The sun shall be darkened and the moon shall not give her light." This latter disaster would of course follow from the former. But as the tides are produced by the attraction of the sun and moon, astronomical disturbances affecting these bodies would be sure to affect the ocean also. It is very remarkable therefore to notice how He goes on to speak of "the

sea and the waves roaring, men's hearts failing them for fear and for looking after those things which are coming on the earth," and I suppose the astronomers and others of those times will be very naturally looking out for other and consequent troubles to be apprehended.

Professor A. H. SAYCE, D.D., LL.D., writes from Cairo to Colonel Mackinlay:—

I have received the proof of your paper, in which I have been much interested. You have put all the facts into a lucid and complete form, and I do not think that they will have admitted of much discussion. Perhaps, if you are revising the paper, a few more words about the precession of the quinoxes might be desirable for the information of the uninitiated—explaining what is meant by "the first point of Aries," the length of time occupied in the precession from one point to the other, etc.

The Rev. Canon R. B. GIRDLESTONE, M.A., writes to Lieut.-Colonel Mackinlay:—

There is a great deal of work in your paper, and the subject is one of deep interest.

1. I observe that you refer to the sun and moon and stars in connection with Gen. i, but it is noticeable that neither the sun nor moon are named in the chapter, whilst the stars are referred to very slightly. There is undoubtedly a theological reason for this, and it is easily understood in the light of Chaldean worship, which deified sun, moon and stars, regarding them as gods and goddesses."

2. I am not sure whether you have referred to "the Queen of Heaven" in Jer. xlv, 17-25: it seems to me an important passage.

3. The word "sabbath" in Hebrew simply means "rest" or "cessation," and is an ancient Semitic root.

4. Your remarks on the calendar are very instructive. It might be well to note, in addition, that the whole Old Testament contains no reference to "hours" until we reach the Book of Daniel. When did the Babylonians divide the day into hours?

5. With regard to points of the compass, some words were used rather vaguely, *e.g.*, the ordinary word for north, which you do not refer to, and which means the hidden or dark region (צפון). The word *semol* is never translated "north" in the A.V. When you enter the Red Sea from the south you have Yemen to the right

of you and Somaliland to the left. Is this an accident? I doubt it.

You have not referred in your table to the ordinary word for "east," or to the strange word (*darom*) translated "south" in several passages. There is a paper with a discussion on the Egyptian and Assyrian points of the compass in the *Proceedings Soc. Bibl. Arch.*, Feb. 1883, which is suggestive.

6. I have no doubt that there was a ridgepole in the Sacred Tent, but I never regarded the post which supports it as a protest against sun-worship.

7. There seems to be a strong *consensus* of opinion in favour of A.D. 29 as the year of the crucifixion, but the evidence is not quite decisive.

8. Our Lord said, "in my Father's house are many mansions." May this point to the existence of many habitable abodes somewhat like our earth? or are we to follow the teaching of Dr. Wallace?

Lieutenant-Colonel MACKINLAY, in reply, said:—I am grateful to all who have taken part in the discussion: the statements of Mr. H. Harding and of the Rev. W. F. Connor are specially valuable, coming as they do from those who have lived for years in Bible lands. I may here also express my gratitude to them and to many others, residents in the East, who have helped me in the preparation of this paper by replying to questions which I have sent to them about the practical use of the heavens now made by natives of various countries, and also about the words used in several of their languages for the points of the compass, etc.

Colonel Conder, in a letter to me, draws attention to the fact that the Hebrews of old proclaimed the new moon directly from the result of observation, and Commander Caborne gives us an interesting modern example of doing this in a Mahomedan country. I am glad attention has been drawn to this arrangement, as it can only be inferred from my condensed account of the need for a cycle in ancient times. The Hebrews had no means of foretelling the beginning of a lunation before the discovery of the Metonic cycle about B.C. 432, and they probably did not make use of it for a long time after that date, but the modern Jews employ this cycle.

Commander Caborne and Professor Orchard each strongly support the belief in the miraculous with special reference to the sun standing still, and I fully agree with them, as we are pointedly



told that "there was no day like that before it or after it, that the Lord hearkened unto the voice of a man" (Josh. x, 14 R.V.) These words leave no doubt on my mind that a miracle is recorded. The reference to the book of Jasher seems to me to indicate that the event was well known. Exactly what happened to the sun or to the earth, or whether the miracle was due to refraction, I cannot tell, nor, I maintain, can anyone do so, but we have the appearance and the practical result plainly described; we have seen how even a modern astronomer frequently describes only appearances, and he does not always go out of his way to state exactly what has happened.

I thank Dr. Heyward Smith for his correction about the name of the ancient Hebrews whom I had called Jews, and I have carried it out in the revision of the proof.

I am glad Canon Girdlestone draws attention to the fact that the sun and moon are described as the two lights in Gen. i, and that the stars are only mentioned incidentally. With our present knowledge of their magnitudes the few words devoted to them, "*he made the stars also*," Gen. i, 16, attain a tremendous climax in asserting the creative power of Jehovah.

The Canon raises an interesting question in connection with a ship entering the Red Sea from the south; but countries generally receive geographical names with reference to other lands which adjoin them; thus Somaliland means "the north land," and it has a long coast line facing the north. The fact that Yemen, "the south land," lies to the north of Somaliland, "the north land," is not an extraordinary state of affairs, as we have similar instances nearer home; for instance, Southend in Essex is to the north of the department of Nord in France.

In accordance with Professor Sayce's suggestion I have added a little to the short explanation about the precession of the equinoxes in the Appendix.

I am glad this subject has been found to be full of interest. I trust that more general attention and study may be directed to it in the future.

## ORDINARY MEETING.\*

D. HOWARD, ESQ., V.P., IN THE CHAIR.

A paper entitled "Geological Exterminations," by Charles B. Warring, M.A., Ph.D., was read by the Secretary, in the author's absence in Canada.

The Secretary also read communications from Mr. Hudleston and Dr. Kidd.

### *GEOLOGICAL EXTERMINATIONS.*

By CHARLES B. WARRING, M.A., Ph.D.

ALL who have studied the life-history of the earth have been impressed with the fact that not only species, but entire genera, families and tribes, have become extinct—not temporarily but permanently, and, broadly speaking, have been succeeded by species more like those of the present day. Dana says: "There was a general extermination of species about the eastern portion of the American continent at the close of the Acadian or Lower Silurian epoch; at the end of the period of the Chazy formation its species, with few exceptions, disappeared."† He says also: "The introduction and extermination of species were going on during the whole course of history, instead of being confined to particular points of time; but at the close of long periods and epochs there were general exterminations."‡ He says also: "At the close of the Cretaceous period occurred one of the most complete exterminations of

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\* Monday, March 6th, 1905.

† Dana, *Mun. of Geol.*, Revised edition, page 182, lines 13 to 20.

‡ *Ibid.*, page 384, lines 21 to 24.

species of which we have any record."\* I might multiply such quotations, but there is no need.

A very important fact in this connection is that after these exterminations the old species do not reappear, but new ones, more like those of to-day, take their places. The biological conditions, therefore, must have changed in the interval, probably a long one, between the birth and death of those species, and always in the direction of those that now prevail; and as this change of species took place all over the world, an explanation must be sought in a cause, or causes, possessing the same characteristics of permanency and universality.

It is usual to attribute these exterminations to the occurrence of continental elevations producing colder climate, or to high latitude depression of land letting cold waters from circumpolar regions flow towards the equator. It is doubtful whether these were sufficiently extensive to be world-wide, and, however that may be, they lack permanency; for in a short time, geologically speaking, the elevations were followed by depressions, and the parts that had been sunk below the normal level came up again; and as for cold water currents, if we may judge from the flora and fauna which have been preserved, circumpolar waters during by far the greatest part of the time when the exterminations occurred differed in temperature but little, if at all, from those within (or at least near) the tropics. It is found that from the Eozoic to the close of the Mesozoic, and in a less degree through the Miocene, one of the most striking characteristics of each horizon was the world-wide prevalence of very similar, and often identical species, with little or no regard to differences of latitude.

It was during that time of mild and uniform climate that the most numerous and most remarkable exterminations took place. There may have been local elevations sufficient to produce even large glaciers—mountains in tropical regions have such now—but their influence in the early days was too limited to need to be considered in this connection. We must, therefore, look elsewhere for causes which were both world-wide and permanent, and which rendered a return to former biological conditions impossible. These we shall find, if I mistake not, in the continuous improvement from the dawn of life in the character of the atmosphere, the waters, and the soil. Its influence was world-wide, never going back, perma-

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\* *Man. of Geol.*, page 487, near bottom.

ment, and always working towards present conditions, and, therefore, rendering a return of former species impossible.

But the question arises, was there such improvement?

The early atmosphere must have contained an enormous amount of carbonic acid, or, as it is now called, carbon-dioxide, for though at one time carbon and oxygen were kept disassociated by the intense heat, yet as the temperature fell, a point was reached when their usual affinities brought them together till one was exhausted. Probably some free oxygen was left, because after that—I know not how soon—there were found protozoa, and these, like all other animals in the water and on the land, require such oxygen.

A very large part of the carbon dioxide had united with lime and other bases, forming insoluble deposits, before the Eozoic. The atmosphere was improved by the operation, but became no richer in oxygen; for this vegetation was necessary. When there began to be even the lowest plants, the oxygen of the dioxide commenced to be freed from the carbon, and returned to the atmosphere, while the other element, the carbon, gave suitable material to plants and their dependents, the animals. All those then living, and all that have come after them, whether now living or buried in the earth as graphite, coal, lignite, oil, gas, or in other forms, existed at the opening of the Eozoic period as carbon-dioxide. Hence its atmosphere was poorer in free oxygen by the amount necessary to turn all that carbonaceous matter back to dioxide, and this, the chemists tell us, is eight pounds of oxygen to only three of carbon; or, to put it in another way, one pound of carbon will turn into dioxide two and a half pounds of oxygen, or, more exactly, two and two-third pounds.

It is impossible to determine the amount of carbon which has passed through plants and animals, but from what has already been found in the comparatively small part of the earth's crust which has been examined, and from what we may reasonably suppose has been carried into the sea, it was sufficient to hold a very large part, probably by far the largest part of the present free oxygen, as carbon-dioxide.

In every hundred pounds of the present atmosphere there are about twenty-three pounds of free oxygen. At the beginning of the Eozoic period, when all subsequent organisms existed only as carbon-dioxide, the amount of free oxygen in one hundred pounds of the atmosphere was very small, perhaps not more than one or two pounds. The atmospheric improvement since has been enormous. The carbon-dioxide is now

only a trace, scarcely 4 parts out of 10,000, while the oxygen has increased to 2,300 out of the same amount. The ratio has so changed from being only a fraction compared with the  $\text{CO}_2$ , that the oxygen to-day is almost 600 times the greater. At no time is there evidence of a return to conditions once passed. The tendency of gases is to diffuse themselves uniformly, irrespective of their specific gravities. This process was aided by aerial currents. There resulted from such action uniformity of atmospheric composition over both land and sea, and in all latitudes. To-day we see the same thing from the same causes.

During the same geological time changes were going on in the water, changes whose biologic influence manifested themselves, or at least were accompanied by, changes of species in the direction of those which now exist. The enormous deposits of what, for lack of a better name, I may call organic limestone and silicates, indicate waters once holding in solution proportionally large amounts of lime and silica. These amounts were greatest at first, and grew less and less as plants and animals progressed in the work of making those insoluble compounds in which so much has been stored away. The amount of lime and silica held by the water was therefore greatest in the Azoic time, grew less in the Eozoic, less yet in the Silurian, less still in the Devonian, and so on down, each period having less than the one before it; until at last, probably in the Quaternary, an equilibrium was reached by the inwash from the land making good that which is removed by present animal and vegetable action.

The presence of these deposits in all latitudes indicates the world-wide character of this process. Moreover the ocean currents, tides and winds, tended to uniformity in the character of the water everywhere. To-day, from local causes, some parts of the ocean hold a larger percentage of mineral matter than do some others, yet on the whole the great ocean is everywhere substantially the same, and probably such was the case in each of the geological periods.

The third biological factor is the soil. This affects directly only vegetation, but indirectly all other forms of life.

As soil is a compound of comminuted rock and vegetable and animal matter, we may safely assume that, while before the Eozoic the former was present as clay, sand, and gravel, there was no soil. This began to form after the other ingredients had been washed upon the emerged land; it increased in quantity and improved in quality as time went on through

the ages. If we may judge from the flora, it reached its present quality in the Pliocene. The change since that period appears to have been an increase of its amount.

It seems, therefore, from the rock-record, that the free oxygen in the atmosphere, the purity of the water of the seas, and the quality of the soil went on, side by side, ever increasing from the dawn of life, till at last the loss and gain became equal near this end of the world's history. In short, there was from period to period a great improvement, world-wide and permanent, in the life-sustaining powers of these biological factors, and always towards present conditions.

Those at the first were prohibitive of any form of life; we know what they are now. Intermediate in time the conditions made only intermediate progress, and the rocks show organisms intermediate between the earliest and latest forms.

Was this coincidence merely a matter of chance, or was it an instance of cause and effect? It appears to me to be the latter, because an intimate relation exists between species and their environment. Leaving out of account temperature, which seems during by far the larger part of geological time to have been pretty much the same everywhere, what other environments existed besides those which we are now considering? Is it not reasonable to suppose that changes in them would seriously affect both plants and animals? That floras and faunas disappeared admits of no doubt, and, so far as I am aware, no other causes possessing the world-wide extent and permanency required are known.

Nor are we confined to theoretical reasoning. Not a few facts are established which have an important bearing on the question. Birds and small mammals, placed in an atmosphere having two or three times the normal amount of oxygen, do not long survive. Fishes brought out of water are said to die from the great amount of oxygen they are compelled to inhale. Plants too highly manured lose the power of reproduction. The seed does not form, or if it forms, does not mature. Even corals are sensitive to the purity of the water in which they live, and if that is materially changed they die. If this is true of present species, is it unreasonable to believe that organisms made for the atmosphere, water and soil of their native period, would die out when these had greatly changed? In this progressive improvement in the quality of these biological factors is found, it seems to me, at least one cause—perhaps the cause—of the disappearance of species and of their never reappearing. Organisms to-day have the power of adapting themselves to

new or changing influences, but only within certain limits, when these are reached they endure the strain no farther. The bow bent too far breaks. Probably it was so in those early periods. The weaker went first, at last all went, and then geologists report a general extermination.

The lower forms of life now are less sensitive to such influences than those of higher rank. It is reasonable to believe that the same was the case in geological times; and if so, may we not find in this fact an explanation of the greater length of the earlier periods as indicated by their fossil remains?

The progress of improvement would seem to have reached its limit, so far as soil and atmosphere are concerned, by the close of the Miocene, for, according to De la Saporita, *Le Monde des Plantes*, page 380, the flora of the Pliocene is still with us. He says:—"The principal groups, and even the genera of the plants which constitute the immense majority of our actual floras, were established from their beginning, probably even before the end of the Tertiary age, in the limits which they now occupy," and again, he says, page 342, "Let us not forget to remark that the European species still living occupy their actual country since the close of the Pliocene. They affect with secondary variations and shadings more or less pronounced the same characteristics as in our own day." If in this Saporita be right, and one may judge by the sameness of plant life from that time onward, neither atmosphere nor soil underwent any further essential improvement.\*

There were, however, great changes in the animal world. Dana probably puts it too broadly when he says on page 518 of his revised *Manual of Geology*, "All the fishes, reptiles, birds and mammals of the Tertiary are extinct." But I think it is beyond question that an enormous proportion of the Tertiary vertebrates have ceased to exist. In the Quaternary the fishes, reptiles, birds and mammals were mainly of new species. At its close the mammals disappeared, the others are with us yet. In the next or present period, we find in place of the mammals of the Quaternary, the cattle and beasts of to-day.

The extermination of the Pliocene fauna seems probably to have been due to the great climatic changes which followed. It is difficult to see why the large, well armed, and well armoured mammals of the Quaternary became extinct. Had

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\* This is not quite correct. The wonderful change in the prevalent flora from monocotyledonous to dicotyledonous plants took place at the close of the Lower Cretaceous period.—Ed.

the order been reversed, and the giants of the Quaternary come last, we could easily understand that order. It then would have been only a case of "the survival of the fittest." In fact it was a survival of the weakest. It adds to the perplexing nature of the problem that the birds of the Quaternary so largely survive. So far as I can see, all that can be said with certainty is that the monsters of the Quaternary would have been a detriment and hindrance to the creatures which were about to make their appearance, and that some "cause unknown to science," probably the same cause that started the chain of life, brought that section of it to an end.

If it be said that man lived at least in the latter part of the Quaternary, and that, gifted with superior intellect, and possessed of weapons, it was he that exterminated those great creatures; then for some unknown reason he destroyed the stronger and better protected species, and avoided killing the weaker but no less fierce ones which still survive. This seems too unreasonable for serious consideration, and so we are still left with the conclusion that the extermination of those monstrous Quaternary species just as present mammals were appearing was due to a "cause unknown to science."

Here I had intended to close my paper, but having been asked to give a brief statement as to the origination of new forms to succeed those exterminated, I will trespass on your patience a little longer.

What has already been said affords no assistance in the solution of this problem. Gravitation and chemical affinity account for the destruction of a building, but give no assistance in explaining the origination of a new one to take its place. For this we must invoke, in addition to physical laws, that to which the painter referred when he said he "mixed his colours with brains." In other words, we here find it necessary to supplement those laws by an intelligence able to employ the forces of nature for its purposes.

Very few will deny the intervention of a Creator when the first species came into existence. On what reasonable grounds can they say that He never did it again? So long as the train is to keep its course the switchman need only watch it as it goes by; but when its course is to be changed then his brain and his hand come into operation.

Now for the application. Imagine a species which has long been in existence approaching its final stage. We know that it did disappear, and that in close proximity to the last of its generation a new species is found.



What method did the Creator employ to bring into existence this new species? That he should have ignored all that he had thus far done and gone back to unorganised earth, air and water, is to me unthinkable: not that He lacked power, but that the All-wise should not have availed Himself of the forms then living, and which needed so little done compared with the *de novo* method, to change them into new species.

The following seems to me to have been what actually occurred, taking one species as typical of all. When this was approaching very close to the destined time of its extinction, the Creator may be supposed to have caused an ovum to develop into a creature resembling in generic traits its predecessors, but making such changes as differentiated the species which is next found. To borrow a suggestion from Huxley, it was as if in a world inhabited only by hyenas, dogs were born to them, and the hyenas ceased. If this occurred simultaneously in a sufficient number of instances, the extermination and origination would be world-wide.

To sum it all in briefest possible form, as it appears to me, the disappearance of species was due to natural law alone in the effects of the betterment of the air, water and soil, while the appearing of new species was due also to natural law, plus the supernatural at the initial point of the new species.

This opens a new theme, one, as it seems to me, of great interest. It would be out of place for me to pursue it now. If any one desires to look into it from the standpoint of the writer, I would refer him to my article in the October number of the *Bibliotheca Sacra* of 1903, entitled *Miracle, Law and Evolution*, a copy of which I did myself the pleasure of sending not very long ago to the Institute.

The thesis there maintained is as follows: God in all His work, whether classed as Miracle, Law, Evolution, Inspiration or Redemption, employed natural means, or, if you please, natural laws to their limit, and then, by His power, did the needed thing, after which the supernatural ceased and natural laws resumed their sole action.

The origination of new species is one of the many applications of this principle.

## DISCUSSION.

Dr. HENRY WOODWARD, F.R.S.—Your Secretary has been so kind as to send me an invitation to come to-day.

I am sorry that the author took as his copy and authority the text-book of Dana, because geological science is one that is always progressing, and you have only to notice the fact that although this work of Dana's has been a most valued text-book of geology in America, and has been largely used on this side also, that it began its first edition about 1859, the second was published in 1874, and the third in 1879. Well now, between 1879 and the present time a great advance in geology has occurred, and I think that it is hardly possible that any geologist or palæontologist can accept the idea of the entire extermination of life in geological time in the sense that Professor Dana and the author express it. Whether we accept and endorse the views of Darwinian evolution, or we retain the old conviction with regard to the creation of all the varied forms of life, we are convinced of one thing, that from the time that life first appeared upon the globe, it has never been entirely exterminated. That is a fundamental principle which I think one might accept without any prejudice or reserve, that life having once commenced upon the earth, it has never disappeared from it.

Then with regard to the appearance of that life. All through the geological periods we have a succession of forms appearing, but of the many groups that have vivified the surface of the earth, and the waters of the sea, very few indeed have been entirely exterminated.\* A few groups have become extinct in the course of long periods of time; such forms as the Trilobites have disappeared. Hugh Miller's great "cherubims" (Pterygoti), found in the Upper Silurian and Devonian rocks, have entirely ceased to live. But the great class of Crustacea to which they belong remains just the same and has gone on through all periods of time, different species having been evolved in a regular orderly sequence up to the present day. I do not think, either, that one can accept the idea of any

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\* Of the invertebrata I find eighteen groups which are persistent; three are extinct; and five groups are of comparatively modern appearance in time.

great break in the physical conditions of the globe. There have been great alterations locally in the earth, both in the distribution of land and water, but these changes have never so materially affected the life on the globe as to bring about its complete extermination. There have always been some parts of the waters of the ocean habitable, and of the land, after land animals first made their appearance, where life was enabled to continue. One thing has to be borne in mind, that in the earlier periods the thickness of the sedimentary deposits was so vast and the time which they occupied in their deposition was so great, that one looks in astonishment at the comparatively small period of time represented by the accumulations formed during Secondary and Tertiary ages. They are more like a few sheets of paper when compared to the vast pile of strata of the older rocks (many miles in thickness. The thousands of feet of the Tertiary and Secondary rocks are entirely eclipsed by the hundreds of thousands of feet thicknesses of strata of the older sedimentary deposits.

With regard to the points the author specially lays stress upon, I merely wish first of all to make an emphatic protest against the opinion of the universal extermination of life at any one time, or that at certain periods a universal extermination took place. Such dogmas were generally accepted by the older geologists, and they saw no other explanation. They did not know sufficiently concerning this ancient life to form a clearer idea. They saw great changes and breaks, and they were not aware that these were not continuous over the whole world; they imagined that each break in the series ushered in a fresh formation and a new creation.

My father, Samuel Woodward, of Norwich, a well known Norfolk geologist, who lived from 1790 to 1838, entertained precisely the same views as the author (Mr. Warring) and Professor Dana did: that there was a general and universal destruction of life at all the different geological epochs, marking each series of formations; but all that is now "ancient history," and no longer accepted by geologists at the present day.

In reference to the three points touched upon by the author, the air, the water, and the soil: with regard to the air, it is now universally accepted by chemists, biologists and geologists, that since life appeared upon the surface of the earth and in the waters of rivers, lakes, and seas, no material change of vast consequence

has occurred in regard to the constitution of the atmosphere or the waters of the earth. It is absolutely necessary for animal life to breathe the atmosphere, whether by taking in the air mixed with the water as fishes take it in, through their respiratory gills, or air-breathing animals, by their lungs or tracheæ. Even the existence of plants requires that there should be a certain regulated amount of oxygen in the air, and that there should be a proportionate quantity of nitrogen gas (which latter is neutral in its action) and an extremely minute quantity of carbonic acid gas.\* If you place a plant in an atmosphere—and these are results of experiments at the Royal Botanic Gardens, Kew, and at other places—too richly endowed with carbonic acid gas, that plant becomes sickly and dies. Therefore there is no doubt that at the time when the great abundance of coal-plants flourished on the surface of the earth, there would not be such an excess of carbonic acid gas in the atmosphere as to prevent those plants from living. When we are dealing with mere plants, we may say for the sake of argument that plants possibly may have been able to survive with a greater quantity of carbonic acid gas *in proportion to the oxygen* in the air. But alongside these coal-plants, we know that in the Carboniferous period there were abundant examples of amphibian reptiles, fishes, mollusca, crustacea, and insects, and that those creatures spent their lives, some in the water, some among the plants, and many of the insects in flying in the air, as, for example, the great dragon-flies, some of which were twenty-four inches across from tip to tip of their wings. Insects, which were all air-breathers, were abundant in the Coal-period. Then there were land-snails, which Sir William Dawson found in hollow tree-trunks of the *Sigillariæ* in the coal-beds of Nova Scotia; there were also many “cockroaches.” It is surprising that cockroaches having begun in the Coal-period, should have continued living to the present day

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\* Oxygen by volume, 20·96 or  $\frac{1}{5}$ th.

Nitrogen by volume, 79·00 or  $\frac{4}{5}$ ths.

Carbonic acid by volume, 0·04 or  $\frac{1}{2500}$ .

The amount of carbonic acid gas is extremely variable, 3 parts in 10,000 is the proportion in the open country, 5 parts in towns, and as much as 30 parts in 10,000 of air in overcrowded rooms. More than this acts *poisonously* on animal life.

scarcely at all changed. They are world-wide in distribution, and still enjoy the *coal-cellar* as they did the Coal-period. There is also a form of king-crab which has survived, but little changed, from that time. Another case of survival is that of the scorpions, which appeared first in the Upper Silurian of Lanarkshire, also in the United States of America, and in the Island of Gotland. These scorpions may have undergone some modification, but they possessed tracheæ; they breathed the air as insects breathe it nowadays. They were probably not aquatic scorpions, but true terrestrial dwellers, and the family has continued to live down to the present day. We notice also that in proportion to their great antiquity in time, so is their wide geographical distribution now. In all the warmer parts of the world we find scorpions living upon dry land. It shows what an enormous vitality these creatures must have enjoyed, which enabled them to change their *habitat* with the changed condition of land and soil, and still live on unaltered through such vast periods of geological time.

I must emphatically enter my protest against the theory of animals living either in the air or on the land without a proper supply of oxygen and a minimum of carbonic acid gas, and also that the waters of the rivers, lakes, and the sea must have been in a similar habitable state. I cannot imagine their being so full of carbonate of lime as to form a veritable peas-pudding in which the animals must swim and aërate their blood.

With regard to the extermination of the larger animals, I am afraid that the author has gone astray there also. Of course everyone who has treated the subject—and I may mention particularly the name of the illustrious Professor, Sir Richard Owen, who pointed out long years ago, that in all times of drought, or flood, or fires, or other troubles on the land, it is always the larger animals that are the first to be exterminated, because they have the greatest difficulty to maintain the struggle for life. They are bound to be killed off. In times of drought they cannot get enough water or food, and the smaller animals either escape by burrowing, or by getting up a tree in a flood, or on high ground, whereas the large animals are carried away and drowned. So when the author says that the large animals ought (according to the law of the selection of the most suitable) to have escaped, his statement is not borne out by testimony and observation. It is the larger animals that most

easily succumb, and the smaller animals that have the greatest chance of escape.

Then with regard to the Quaternary period, Mr. Warring seems to be again in error. The Quaternary period is that in which we are now living. There cannot be any distinction drawn between the latest or Quaternary deposits and those of to-day; man goes back in time through all the Quaternary period, and the animals we see to-day belong to the Quaternary period also.

Then with regard to size, I must say that the author seems to be a little in error. The larger land animals were the huge land-reptiles, the Dinosaurs, and they lived between the Trias and the Chalk periods. There was during the Chalk period a great terrestrial extent of the earth's surface exposed and habitable and whose animal remains are found in old lake-deposits, *not in marine* beds like our chalk. There were large tracks in America where animals of huge size dwelt, and among them were those reptiles, the Dinosauria. They all died out at the end of the Chalk period.

Take again the great group of fishes, for instance; they commenced in the Silurian, and forms resembling some of those living to-day are found in Devonian rocks. Sharks occur in the Devonian, and forms of scaly fishes. The principal difference is that the fish of to-day usually possess a strong bony skeleton, whereas in the earliest fishes there was no hardened skeleton—they were notochordal, having only a gelatinous or cartilaginous skeleton; many also had a covering of hard armour plates. Some of the cartilaginous fishes (*e.g.*, the sharks) are living to-day.

With regard to the birds, they appeared first in the Jurassic period, and the earliest possessed teeth, but they were clothed with feathers; they were not reptiles. We have never found any other animals, save birds, that possessed feathers. Then in the London-clay period more birds appear, some with serrated jaws (not true teeth) and some with long horny bills, like grebes and Solan geese, well adapted for catching fish, so that *modern birds* really may date from the Eocene period, and they have thus a long historical record. Mammals were supposed to begin in the Trias and go on to the present day, but the remains found in the Trias probably represent Ammodont or Theriodont reptiles that had some affinity towards mammals, but were not really mammals at all. In the Purbeck

beds there were undoubted small mammals, and so from that period we have evidence of mammalian life, and the surviving reptiles were not such huge creatures as in the earlier periods.

When it is said that the largest of living animals had disappeared, the author had forgotten the existence of the great "Right-whale," which is a mammal, 80 to 120 feet in length, and the largest of all animals that *ever lived* upon the surface or in the waters of the globe. The whales are larger than any of the great reptiles, the Dinosauria. So large a creature could not have supported existence upon the land; even had its limbs served, it would be absolutely impossible for purposes of locomotion upon dry ground, from its vast bulk. It could only move in the water, in which the more-resisting medium of that fluid enabled it to support its bulk and live. The land reptiles were limited as to size. Even the largest of them, the *Brontosaurus* (perhaps 70 feet in length), one of which is about to be set up by Mr. Andrew Carnegie in the Natural History Museum this year, is supposed to be an animal which *walked under water* and put its head out to breathe, and fed upon the aquatic plants growing at the bottom of the rivers or lakes. This has *only been suggested* by Professor Cope, and therefore is not put forward as a well-ascertained fact in science.

May I be permitted to read these few lines to you from Huxley: "If there be any result which has come more clearly out of geological investigation than another, it is that the vast series of extinct animals and plants is not divisible into distinct groups by any sharply-marked boundaries. There are no great gaps between epochs and formations, no successive periods marked by the appearance of plants and animals *en masse*. Every year adds to the list of links between what the older geologists supposed to be entirely separate epochs. Witness the Craggs linking the Drift with Older Tertiaries; the Maestricht beds linking the Tertiaries with the Chalk; the St. Cassian beds exhibiting a mixed fauna of mesozoic and palæozoic types in rocks of an epoch once supposed to be eminently poor in life; witness, lastly, the incessant disputes as to whether a given stratum shall be reckoned Devonian or Carboniferous, Silurian or Devonian, Cambrian or Silurian." (Huxley, *Lay Sermons*, p. 243), [written before 1870, soon after the appearance of Darwin's *Origin of Species*]. This was written by Huxley before 1870, so that the author has overlooked an important

authority as early as Dana, whom he quotes. Dana was not so much a palæontologist as a great mineralogist, but the author of the paper certainly might have quoted Huxley and several other able authorities affording abundant evidence of the continuity of life, which has never been broken or interrupted since its first dawn upon our earth.

Rev. A. IRVING, D.Sc., B.A.—We are very much indebted to Dr. Woodward for his remarks. I have learnt something from them, and I should like to draw attention to one or two views that fell from him. As to one thing in particular, the effect of the relative proportions of carbonic acid in the atmosphere upon the life of plants. Dr. Woodward informed us that certain experiments at Kew had led to the conclusion that much carbonic acid kills the plant. My experimental investigations carried on at Wellington College in the “eighties” led to that conclusion, so long as I dealt with simply a mixture of carbonic acid and nitrogen; but when I introduced an equivalent amount of oxygen—about one volume of oxygen to one volume of carbonic acid along with nitrogen, I found that the plant-growth increased with rapidity, and moreover, with their roots saturated with water (as those of the coal measure plants were when growing), with exactly the same conditions of light, and in every way exposed to the same conditions, except in the proportions of the gases, to which their foliage was exposed.

No well-informed student of geology would dream of reviving the obsolete notion of “cataclysmic” disappearances of life, to which Dr. Woodward has made reference. That cannot fairly be read into Dr. Warring’s paper. We should recollect, however, that the main business of the Victoria Institute is not with the detailed investigations of this or that special science, but with the co-ordination of the results achieved in all the sciences with those arrived at in other lines of research. From that point of view the most important and most interesting part of the paper before the meeting is found in the concluding paragraphs. It opens up a vast field for discussion, but, as time is short, it may suffice to say that in Nature and in Revelation alike we find the great law of Evolution written upon all things; but that law is not all, and does not account for all, that comes within the ken of the human mind in the universe of Being. In the light of that higher “monism” which runs through the Bible revelation we can trace a *directing influence*, which has not left the wild forces of Nature to work out



their results in a purely hap-hazard sort of way, such as is implied in the Darwinian dogma ; we can, in fact, recognise directivity (as defined by Professor George Henslow) in the very variations, which must be antecedent to selection. Evolution pure and simple must imply that every new departure on the road of development is evolved *solely* out of the facts that preceded it, and the material and other properties latent in those facts, including environment. Yet when we come to consider the origin of matter and its properties, we are a long way from grasping any intelligent idea of matter originating in mind, though everything in Nature proclaims a controlling mind.

Again, the mystery of life is inscrutable ; and whatever ideas we may ultimately get as to the intrinsic nature of life, it is not likely that we shall ever get rid of that element of *scientific faith* which holds the minds of Haeckel and his followers. The sneer from that side implied in the word "miracle" is but an "appeal to the (Agnostic) gallery" ; and it is illogical for Haeckel to maintain that a legitimate place is found for *faith* (implying an exercise of the imagination) in science, and at the same time to dismiss the exercise of precisely the same intellectual faculties in the field of religion as mere "illusion and fancy." And so we are led on to the mysteries involved in the great Christian verities, and to that "pure Agnosticism" of George Romanes, which is content to say, "I don't know," "I don't understand," without having the effrontery to say (ergo) "You don't know or understand." "Nobody can know or understand." Such Agnostic dogmatism is utterly unphilosophical, and must remain so, until at least the origin of *matter* and its properties, and the origin of *life* with its vast variety of manifestations are removed from the region of the unexplained *quæ* natural causation.

Rev. JOHN TUCKWELL, M.R.A.S.—With very much of this paper I am in entire agreement. But there are some important facts to which insufficient weight has been allowed. First of all I do not think we can rely upon the uniformitarian principle altogether in the geological processes of the past.

The very fact that at certain epochs many more forms of life disappeared and with much greater geological suddenness than at others, implies something more than the ordinary processes of nature. The late Professor Prestwich, in a paper read before this Institute ten years ago, pointed out that a great diluvial catastrophe overtook

the continent of Europe in post-Pliocene times, I believe, which must have swept away the whole of its mammalian life. He connected this with the traditional Deluge, and I suppose the tens of thousands of mammoths and mastodons whose remains have been found in some cases frozen, and the flesh in a perfect state of preservation, must have perished suddenly and probably in connection with the same event.

I quite agree with the author that the mere elevation of the earth's surface will not account for these events.

Dr. WALTER KIDD, F.Z.S.—Without being a geologist, I desire to point out that this important subject of geological exterminations has considerable bearing upon current and unsolved problems in biology. The exclusive sway of selection in the production of new forms of life has received of late years strong support from Darwin's greatest follower, and Weismann has summed up his own life's work in two volumes, *The Evolution Theory*, in which he has elaborated further his theory of germinal selection invented ten years ago, so as to rehabilitate the doctrine of Darwin's natural (personal) selection. He has finally declared, after great study of the matter, that Lamarckism is a delusion, and that acquired characters are not *transmissible*. This sweeping doctrine is intimately connected with our subject of to-day thus: granting that evolution or modification of species has taken place through the ages of geology, this must have come about in one of three ways—either by direct modification of the organism by its environments and use of function—or by selection alone,—or by the combined actions of selection and use—inheritor and direct environmental action. Weismann is forced to allow that among unicellular organisms environmental influence is supreme, but maintains that when multicellular organisms arose and *amphimixis* (or the mingling of two streams of heredity from two parents) occurred, the influence of environments and use and disuse in evolution abruptly ceased, and that at this dividing line in the history of the organic world selection remained in unquestionable predominance, and that selection is even anterior to the birth of the organism, for it begins in the germ. The fact shown to-day, in the paper before us, that exterminations on a vast scale have continued through geological history by reason of changes of atmosphere, water and soil, is a glaring contradiction to this pan-selectionist theory of Weismann. These exterminations are, many of them at

least, wholesale, and so much so that individual variations could have no influence upon individual survival. We may not affirm the old doctrine of repeated catastrophes, but surely many of the great extinctions of floras and faunas of the world have been quite as vast as the catastrophes formerly supposed, although they have been obviously gradual in most cases. We have but to look at the face of a chalk cliff some hundred feet high, literally composed of the skeletons of the Foraminifera, Polycistina, and Diatoms with their *débris*, or the "Atlantic Ooze" of to-day, going through the experience of the chalk of the Cretaceous period, or to study a bed of Nummulitic limestone some thousands of feet in thickness, and to examine a piece of this from the Great Pyramid, and find nummulites of all sizes from a split pea to a florin; we have only to consider these gigantic evidences of organism entombed *en masse* by the physical agencies concerned in geological exterminations, to see that individual fitness to survive can have had, in these vast masses of organisms, no part or lot in the matter. What individual fitness, we may ask, determined the death or survival of the myriads of club-mosses and tree-ferns which went to make up the coal-measures of the world? They perished evidently *en masse*, and it may be assumed that such of them as happened to live to propagate their species with variations suited to new environments were *directly* modified by the changing environments.

We have heard of the heroic Sixth Brigade of the Japanese before Port Arthur, making one of the most desperate assaults ever made by infantry on powerful forts, going into action with 5,000 men, of whom 400 alone remained when the forts were taken, and of the Colonel of the 1st Regiment, the hero of fifty-seven combats, who habitually exposed himself in the firing line, and who according to the usual calculations should have been long ago dead and buried, and we are forced to admit that no more did the colonel survive because he was fitted to survive than did the 4,600 of the Sixth Brigade fall because they were unfitted to survive under the remorseless extermination of shell fire and bullets. This, I submit, is parallel to the wholesale and impartial destruction of masses of organisms of an early and lowly class, though not all of that unicellular group in which alone does Weismann fail to bring in selection as the *deus ex machinâ*.

This aspect of the subject gives "geological exterminations" a

living interest for the naturalist in addition to the other useful points raised in the paper.

Rev. G. F. WHIDBORNE, M.A., F.G.S.—I have read Dr. Warring's suggestive paper with very great interest. The extermination of species is self-evident, *e.g.*, *Spirifer*, *Pterodactyle*, *Ammonites*, etc., must have been exterminated. That any living species is descended from them is unthinkable. The many monotremata are now reduced to two.

That at times extermination was synchronously predominant may also be predicated, without, of course, suggesting that it was at any time complete. There are often rapid disappearances of whole groups of species that never recur in the same profuseness again. At most continuance is accounted for by "survival of the fittest." But evidently that expression is intrinsically inaccurate; its meaning is intended to be "survival of the fittest in a modified form." Dr. Warring I understand tells us that the commonly suggested causes for these survivals are insufficient, and suggests three others of a chemical character. Whether these in turn are altogether adequate for the effects may perhaps be questioned. We have far the most evidence in geological history of sea animals. Their genealogy may be treated alone. Two of Dr. Warring's three causes practically vanish with regard to them. Atmosphere and soil could have had very slight and indirect effects upon *them*. We have then only the chemical change of the sea to account for their genealogy. Is it sufficient to have produced the evolution ascribed to it? For instance, the assumed excess of lime might be supposed to have resulted in more massive shells, but as an instance *Spiriferina* of the Oolites are, speaking generally, more massive than *Spirifera* of the Devonian. Devonian Gasteropods from Chudleigh, placed besides recent specimens of similar form, are almost similar in massiveness. But I in no way wish to suggest that Dr. Warring's three causes are not effective, but only that they are not in themselves fully adequate for the effects assigned them. They may come to the help of the other causes asserted to produce evolution; the result is that we get a still greater variety of assigned causes, and the advantage in Dr. Warring's causes is that a sequence in the causes is at least implied congruous with the sequence of effects, though insufficient in itself to account for them. But what Dr. Warring emphasises is that the sequence of effects is orderly, a

continued orderly advance towards the present conditions. So after all it seems to me that the conclusion of his argument is reached, that behind any causes that can be imagined to have worked in the building up of biological history, there must have been a constant directive energy designing that such results should come. The instance he gives of the evident "survival of the unfittest" in the Quaternary age—that is, the "unfittest physically, though the fittest cosmically," is certainly remarkable.

In the closing paragraph he suggests a relationship between "natural law" and "the supernatural." This raises the question whether the general conception of "natural law" is not in itself defective. To us "natural laws" appear binding rules, necessitating effects. But from the point of view of the divine Lawgiver natural laws are not necessities but perfection of will. He, being what the Christian believes Him to be, has not enacted regulations by which the work and progress of nature shall be independently governed; but He Himself evolves it throughout and to the minutest particular by the infinite congruity and consistency of His will. The law of God is perfect from its inception to its action. His law is His will; voluntary to the minutest degree, but also consistent to the minutest degree. And so the supernatural to us is only a further manifestation of His volition, which to our eyes seems above natural law, but which in itself is only another cycle in the active consistency of God.

Professor EDWARD HULL, F.R.S. (Secretary).—The subject brought before us is one of great interest and great difficulty. Mr. Hudleston writes on this subject: "Exterminations in the Earth's history are more apparent than real and are largely due to the imperfection of the Geological Record." I concur in Mr. Hudleston's view—yet there are some points bearing on the subject which require explanation. In the first place, we may notice the great longevity (so to speak) of some genera and the brief duration of others. Thus the *Nautilus* which survives in our oceanic waters commenced its career in the Silurian period; so with the *Lingula* and a few other forms. On the other hand, a most prolific oceanic genus, the Trilobite, ended its career in the Carboniferous. It is difficult to account for the longer duration of the former as compared with the latter, for both were inhabitants of the successive oceans. Another biological fact of great interest and obscurity is

the excessively limited range of the various species of *Ammonites* throughout the Jurassic and Liassic periods, so that their life's history seems limited to the time necessary for the deposition of a few inches or feet of strata. The succession of the Ammonite forms without any apparent change in the environment, as far as it is possible to carry observation, is one of the most curious problems in the life history of oceanic forms. It is otherwise with land forms and those which inhabited estuaries and shallow waters, there, slight physical changes may easily have brought about the destruction of whole races.

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P.S.—On reading Dr. Woodward's important remarks, it seems to me that he has rather mistaken the views of the author of this paper. It does not seem to me that Dr. Warring wished to be understood as holding that all life was at any time exterminated over the globe after its original appearance, and was subsequently reintroduced, but that from time to time, certain genera and species were exterminated, or failed to leave descendants.

## ORDINARY GENERAL MEETING.\*

PROFESSOR LIONEL BEALE, V.P., F.R.S., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following paper was read by the Secretary, in the absence of the Author :—

*THE NEBULAR AND PLANETESIMAL THEORIES OF  
THE EARTH'S ORIGIN.* By WARREN UPHAM, M.A.,  
F.G.S.Amer. (Hon. Corresponding Member.)

**A**STRONOMY and geology, chemistry and physics, with their very useful arm or ally, spectroscopy, seek together to discover the origin and development of the earth and the moon, of the sun and his retinue of planets, and of the starry universe :

“ In the beginning how the heavens and earth  
Rose out of chaos.”

While we are assured that they “ declare the glory of God,” and that “ all things were made by Him,” it has also been learned not less surely that He has worked by His established physical and chemical laws in the creation of suns and worlds. We may partially discern the laws, or methods of working, through which the Creator has made and upholds the myriads of stars and our relatively small, but yet vast, solar system ; but beyond all that we know, as, for example, of the laws of gravitation, everywhere lies mystery which baffles our comprehension.

How all matter is influenced by all other matter and drawn toward it, how the earth began and came to its present condition, how the crystal or the plant or the animal grows, “ great things and unsearchable, marvellous things without number,” proclaim an omnipresent and omnipotent Creator and Ruler.

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\* Monday, March 20th, 1905.

To learn continually more and more of His thoughts, as revealed in His works, is the highest reward of the student of nature; and increased powers of vision, whether with the telescope or the microscope, open ever-widening fields of knowledge and new problems to be solved. In every direction the search for truth reaches no limit; and in the themes of this paper, although much has been ascertained, infinitely more remains for inquiry.

The nebular hypothesis or theory may well be called the grandest generalization in all the range of the natural sciences. As most elaborately stated by the eminent astronomer and mathematician, Laplace, in his *Exposition du Système du Monde*, this theory traces the beginning and development of the solar system from an original gaseous nebula, an exceedingly tenuous and intensely heated cloud of matter, extending in a spheroidal form beyond the orbit of Neptune, the outermost planet. By its gravitation and resulting contraction, the nebula is supposed to have acquired a movement of rotation, with polar flattening. Whenever the outer equatorial belt of the revolving nebula attained a centrifugal force exceeding the attraction toward the central mass, a part would be left behind, either as a relatively small revolving nebulous body, or as a ring of such matter, somewhat like the rings of Saturn. Later the ring, if it was at first of that form, would be broken; and, finally, the detached mass would be gathered into a globe, which, in its condensation, would form satellites in the same manner as outer parts of the great central mass formed the successive planets.

Under this theory the principal features of our planetary system, implying unity of origin and development, find a consistent general explanation. Professor Charles A. Young has enumerated these features, which could only have originated by some long process of orderly evolution, as follows:—\*

1. The orbits of the planets are all *nearly circular*.
2. They are all nearly *in one plane*, excepting considerable divergence of some of the little asteroids.
3. The revolution of all is *in the same direction*.
4. There is a curiously *regular progression of distances* between the planetary orbits.
5. There is a roughly *regular progression of density*, increasing both ways from Saturn.

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\* *Text-Book of General Astronomy*, 1893, p. 515.



6. The plane of the planets' rotation *nearly coincides with that of the orbits.*
7. The direction of the rotation *is the same as that of the orbital revolution*, excepting probably the two outermost planets.
8. The *plane of orbital revolution of the satellites* is nearly coincident with that of the planet's rotation.
9. The *direction* of the satellites' revolution also coincides with that of the planet's rotation.
10. The largest planets rotate most swiftly.

That these wonderfully harmonious relations of the planets to each other and to the sun, and of the satellites to the planets, could have originated by any fortuitous concurrence of matter, like the visits of comets which may come from any part of the heavens, is utterly improbable. There is not one chance in millions for the order of the solar system to have come to pass without a systematic development; but the sublime theory of Laplace, in its main outlines, with modifications as required by further knowledge of astronomical and physical laws, or some other nebular theory, perhaps the one most fully reviewed in this paper, accounts for all this majestic unity of the Creator's plan in launching the earth and its associate planets to revolve around the enormously larger central sun.

Instead of an originally gaseous and very hot condition of the parent nebula, as supposed by Laplace, some prominent English physicists and astronomers have thought that in its earliest definable condition it consisted of meteorites, that is, particles and little masses of solid and cold matter. Sir Norman Lockyer, reasoning from his extensive investigations in spectrum analyses, states this view as follows\*:—"Nebulæ are really swarms of meteorites or meteoritic dust in the celestial spaces. The meteorites are sparse, and the collisions among them bring about a rise of temperature sufficient to render luminous some of their chief constituents."

Besides the testimony of the spectroscopic concerning the characters of the nebulæ, we may consider the rings of Saturn, which are very thin but have great areal extent, as probably a strong evidence of the meteoritic derivation of the planet and the sun. Richard A. Proctor, after stating the physical

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\* *The Meteoritic Hypothesis, a Statement of the Results of a Spectroscopic Inquiry into the Origin of Cosmical Systems*, 1890, p. 322.

impossibilities of the existence and permanence of these unique rings as either solid or liquid continuous bodies, wrote\* :—

“The sole hypothesis remains that the rings are composed of flights of disconnected satellites, so small and so closely packed that, at the immense distance to which Saturn is removed, they appear to form a continuous mass.”

In other words the Saturnian rings are made up of myriads of separately moving small masses, which are doubtless similar to the stony meteorites that fall rarely on the earth.

Again, the origin of the hundreds of asteroids, or minor planets, mostly no more than a few miles in diameter, but including several from 100 to perhaps about 300 miles in diameter, seems very readily explained under this modification of the nebular theory.

Professor Young well says† :—

“The *meteoric* theory of a nebula does not in the least invalidate, or even to any great extent modify, the reasoning of Laplace in respect to the development of suns and systems from a *gaseous* nebula. The old hypothesis has no quarrel with the new.”

Another theory, which differs more widely from that of Laplace, has been very recently proposed by Professor T. C. Chamberlin, of the University of Chicago, who names it the Planetsimal Hypothesis. His studies in this direction have been in progress about five years, with publication of preliminary papers,‡ preparing the way for the new hypothesis; but its first somewhat detailed statement in print has appeared since the beginning of the present year.§ In this latest paper, Professor Chamberlin gives the following principal outlines of his researches for a new and more applicable nebular theory, especially having in view its relation to the origin of the earth.

\* *Saturn and its System*, second edition, revised, 1882, p. 135.

† *Text-Book of General Astronomy*, p. 526.

‡ “An Attempt to Test the Nebular Hypothesis by the Relations of Masses and Momenta,” in the *Journal of Geology*, Chicago, vol. viii, pp. 58-73, Jan.-Feb., 1900. “On a possible Function of Disruptive Approach in the Formation of Meteorites, Comets, and Nebulæ,” *Journal of Geology*, vol. ix, pp. 369-392, July-August, 1901.

§ “Fundamental Problems of Geology,” in *Year Book*, No. 3, for 1904, of the Carnegie Institution of Washington, published in January, 1905, pp. 195-258.

"Under the typical form of the planetesimal hypothesis it is assumed that the parent nebula of the solar system consisted of innumerable small bodies, planetesimals [infinitesimal planetoids], revolving about a central gaseous mass, somewhat as the planets do to-day. The hypothesis, therefore, postulates no fundamental change in the system of dynamics after the nebula was once formed, but only an assemblage of the scattered material. . . .

"An inquiry into the possible modes by which the planetesimal condition might arise revealed several possible methods. Such condition might arise from a nebula that was originally gaseous. If, for example, it be supposed that the parent nebula was a gaseous spheroid, and that it detached material from its equatorial belt molecule by molecule, rather than by rings, as postulated by Laplace, these molecules would probably become planetesimals instead of members of a true gaseous body . . . There is reason to believe that this method would really be almost the only systematic one by which a gaseous spheroid of the Laplacian type would detach material from its equatorial belt. . . .

" . . . To develop the hypothesis as definitely and concretely as possible, I have further chosen a special case from among those that might possibly arise, the case in which the nebula is supposed to have arisen from the dispersion of a sun as a result of close approach to another large body. The case does not involve the origin of a star nor even the primary origin of the solar system, but rather its rejuvenation and the origin of a new family of planets . . . This particular sub-hypothesis was selected for first development (1) because it postulates as simple an event as it seems possible to assign as the source of so great results; (2) because that event seems very likely to have happened; (3) because the form of the nebula supposed to arise in this way is the most common form known, the spiral; and (4) because spectroscopic observations seem at present to support the constitution assigned this class of nebulae . . .

"The continuous spectrum is interpreted to mean that their chief luminous material is in a liquid or solid state. . . . As the liquid condition is limited to a rather narrow range of temperature, and as this range is very different for different material, it is improbable that any large portion of a nebula is in this state, and the whole may be conveniently treated as though it were formed of solid matter, but matter in a finely divided condition. This last qualification seems necessary, for the volume of these nebulae is often very great, and yet they appear to intercept but little light and give no signs of great attractive power.

"The prevailing form of these nebulae is the *spiral*, as determined by the late Professor Keeler, and this form particularly characterizes the smaller nebulae recently brought to knowledge by improved instruments and manipulative skill. Those newly discovered

nebulae are estimated to number at least ten times the whole number previously known. From the superior number of spiral nebulae it is a safe inference that their peculiar forms represent some prevalent process in celestial dynamics. This is in itself a reason why research should turn to them, by preference, for the origin of the present solar system.

"A notable and seemingly very significant feature of these nebulae is the presence of *two dominant arms* that arise from diametrically opposite sides of the nucleus and curve concentrically away. No single arm-spiral of the watch-spring type has been found, so far as I am aware. There are often more than two arms in the outer part, and there is much irregularly dispersed matter, but even in the more scattered forms the dominance of two arms is discernible.

"A second feature of note is the presence of numerous *nebulous knots* or partial concentrations on the arms and more or less outside them. So, also, the more diffuse nebulous matter is unequally distributed, and in some of the forms, regarded as youngest, dark spots and lines emphasize the irregularity.

"All these features go to show that these forms are controlled, not by the support of part on part, as in a continuous body or in a mass of gas or even in a definite swarm of quasi-gaseous meteorites, but by some system of combined kinetic energy and gravity which *permits independence of parts*. It is, therefore, conceived that the innumerable solid or liquid particles which the continuous spectrum implies, revolve about the common center of gravity as though they were planetoidal bodies. If this were certainly known to be the case, these might well be called *planetesimal nebulae*.

"It is clear from the tenuity of these nebulae, as seen from the side of the spiral, that they are disk-like, and this is directly shown to be so when they are seen obliquely. In their disk-like shape these nebulae conform to the mode of distribution of matter in the solar system. Within the area of their disks, also, the distribution is irregular, as it is in the solar system—a fact too much overlooked by reason of our predilection for symmetry, under the influence of the symmetrical Laplacian conception.

"All of the more familiar spiral nebulae have dimensions that vastly transcend those of the solar system, and they cannot be taken as precise examples of the solar evolution. . . . It is to be hoped, however, that the present rapid progress in the perfection of instruments and of skill will soon bring within the reach of successful study some of the smaller spiral nebulae that represent the solar system more nearly in mass and proportions.

"With this much of knowledge and of limitation of knowledge relative to existing nebulae, the construction of a working hypothesis required not a little resort to supplementary deductive and hypothetical considerations. The inference that a spiral nebula is

formed by a combined outward and rotatory movement implies a preexisting body that embraced the whole mass. In harmony with this, an ancestral solar system has been postulated—a system perhaps in no very essential respect different from the present one . . .

“To this conception of an ancestral sun with an undefined antecedent history as a star, question will arise at once as to a sufficiency of energy for the sun’s maintenance through such a prolonged history. . . . This objection is based on the assumption that the sun’s heat and light are derived *almost wholly* from self-compression, as urged by Helmholtz. This self-compression has usually been computed on the basis of certain limiting assumptions, the validity of which is open to question. . . . The extraordinary energies displayed by radio-active substances are doubtless but an initial demonstration of immeasurable energies resident in other forms of matter and in the constitution of the sidereal system and competent for its maintenance for unassignable periods. . . .

“ . . . No appeal is here made to collisions as a source of the parent nebula of the solar system, but only to an approach of the ancestral sun to another large body, and this approach is not assumed to have been very close. . . .

“Our present sun shoots out protuberances to heights of many thousands of miles, at velocities ranging up to 300 miles per second and more. If it were not for the retarding influence of the immense solar atmosphere, some of these outshoots would doubtless project portions of themselves to the outer limits of the present system, and perhaps in some cases quite beyond it, for the observed velocities sometimes closely approach the controlling limit of the sun’s gravity, if they do not actually reach it. . . . If with these potent forces thus nearly balanced the sun closely approaches another sun or body of like magnitude, suppose one several times the mass of the sun, since it is regarded as a small star—the gravity which restrains this enormous elastic power will be *relieved along the line of mutual attraction*, on the principle made familiar in the tides. At the same time the pressure transverse to this line of relief is increased. Such localized relief and intensification of pressure must, it is believed, result in protuberances of exceptional mass and high velocity. According to the well-known tidal principle, these exceptional protuberances would rise from opposite sides, and herein lies the assigned explanation of the prevalence of two diametrically opposite arms in the spiral nebulae.

“Nothing remotely approaching a general dispersion of the ancestral sun seems to be required. The present planets and their satellites altogether amount to about one-seven-hundredth part of the mass of the system. Simply to supply the required planetary matter, the protuberances need include but this small fraction of

the ancestral sun. However, some considerable part of the projected matter must probably have been gathered back into the sun, and some part may possibly have been projected beyond the control of the system. Making allowances for both these factors, the proportion of the sun's mass necessarily involved in the protuberances is still very small. Apparently 1 or 2 per cent. of the sun's mass would amply suffice.

"The distal portions of the protuberances would obviously be formed from the superficial parts of the sun; while the later portions of the ejections forming the proximal parts of the arms would doubtless come mainly from lower depths, and hence would probably contain more molecules of high specific gravity. In this seems to lie a better basis for explaining the extraordinary lightness of the outer planets and the high specific gravities of the inner ones, than in the separation, from the extreme equatorial surface of a gaseous spheroid, of successive rings whose total mass only equaled one seven-hundredth part of the original nebula.

"It seems consistent with the conditions of the case to assume that the protuberances would consist of a succession of more or less irregular outbursts, as the ancestral sun in its swift whirl around the controlling star was more and more affected by the latter's differential attraction; and hence the protuberances would be directed in somewhat changing courses, and would be pulsatory in character, resulting in rather irregular and somewhat divided arms, and in a knotty distribution of the ejected matter along the arms. These knots must probably be more or less rotatory from inequalities of projection.

"It is thus conceived that a spiral nebula, having two dominant arms, opposite one another, each knotty from irregular pulsations, and rotatory, the knots probably also rotatory, and attended by subordinate knots and whirls, together with a general scattering of the larger part of the mass in irregular nebulous form, would arise from the simple event of a disruptive approach.

"The problem of the luminescence of nebulae is confessedly a puzzling one. There is little ground for assigning general incandescence to matter so obviously scattered and tenuous, and possessed of such an enormous radiating surface. The assignment of the light to the collision of meteorites, as done by Lockyer, encounters both dynamic and spectroscopic difficulties. The recent discoveries of the luminescent properties of radio-active matter and of its power to awaken luminescence in other matter offers some hope of a solution.

"The solution of the problem may, however, lie along electrical lines. At present it seems more probable that the luminescence arises from some agency that acts at low temperatures, than that it is dependent on heat, and hence objections to a planetesimal organisation on the ground of low temperature do not seem to me to have much force.

"In attempting to follow the probable evolution of such a spiral nebula, three elements stand out conspicuously; (1) the central mass, obviously to become the sun; (2) the knots on the arms that are assumed to be the nuclei of the future planets and perhaps satellites; and (3) the diffuse nebulous matter to be added to the nuclei as material of growth. In the particular case of the solar nebula it is assumed (1) that the central mass was relatively very great; (2) that the knots were very irregular in size and placed at irregular distances from the center; and (3) that the nebulous portion was very small relative to the central mass and probably large relative to the knots.

" . . . Since all the planetesimals and planetary nuclei were revolving *in the same direction* about the solar mass, the collisions were all overtakes, and could have been violent only to the extent of their differences of orbital velocity, modified by their mutual attractions. These velocities are of a much lower order than the average velocities of meteoritic collisions. Many of the overtakes would obviously be due to differences of velocity barely sufficient to bring about an overtake. When the relative mildness of impact is considered in connection with the intervals between impacts at a given spot, the conviction can scarcely be avoided that *the surface temperature would not necessarily have been high*. It seems probable that it would have been moderate throughout most of the period of aggregation, and certainly so in the declining stages of infall.

"By graphical inspection of all probable cases, it may be seen that the possibilities of overtake favourable to forward rotation exceed those favourable to retrograde rotation. This holds true on the assumption of an equable distribution of planetesimals, which may fairly be assumed as an average fact, but not necessarily as always the fact; and hence the conclusion is not rigorous, and a backward rotation is not impossible. From the nature of the case, a varying rotation for the several planets is more probable than a nearly uniform one.

"It is also obvious that the impacts on the right and left sides of a growing nucleus, as well as those on the outer and inner sides, might be unequal, and hence *obliquity* of rotation of varying kinds and degrees might arise. As the solar system presents these variations, the method of accretion here postulated seems to lend itself happily to the requirements of the case.

" . . . A planetary nucleus gathers planetesimals that have orbits both smaller and larger than itself, and hence in effect it sweeps a space both outside and inside its own zone. The breadth of this space is dependent on the eccentricity of its own orbit and on the eccentricities of the orbits of the planetesimals it gathers in on either hand.

" . . . For the large planets that have dominated their

collecting zones and presumably swept them thoroughly, the reductions of eccentricity are subequal. For the very small bodies that presumably grew but little, *the eccentricities remain large*, for the greater part. For example, the eccentricity of Mercury, the smallest of the planets, remains more than twice that of any other planet. Mars, the next smallest in size, comes next in eccentricity among the planets, while the asteroids, which probably grew but little, have high eccentricities, as a rule. . . .

"To bring out the geological bearings of the planetesimal hypothesis, I have given considerable time to a study of the probable stages of growth of the early earth, of the time and mode of introduction of the atmosphere and hydrosphere, and of the initiation of the great topographic features, together with the leading modern processes.

"Following the postulates of the previous sketch, a nebular knot is assumed to have been the nucleus of the growing earth. . . . Assuming that the nuclear mass was quite small, it is inferred that it was composed chiefly of matter of high molecular weight, since light molecules would be liable to escape because of their velocities. The nucleus is supposed to have been originally an assemblage of planetesimals grouped together by their mutual gravity, and to have passed gradually into a solid mass in connection with the capture of outside planetesimals. . . .

"As the solid nucleus thus formed may not have been massive enough to control a gaseous envelope in its earlier stages, a possible atmosphereless stage is to be recognized. Just how massive a planetary body must be to hold permanently an appreciable atmosphere is not accurately computable at present, because of the uncertain value of some of the factors involved. A fairly safe conclusion may perhaps be drawn from known celestial bodies. The moon . . . has no detectable atmosphere, nor has any smaller body, whether satellite or asteroid, so far as known. Mars . . . has an appreciable, but apparently quite limited, atmosphere. The limit between atmosphereless and atmosphere-bearing bodies probably lies between the two, *i.e.*, roundly between one-eightieth and one-tenth of the earth's mass. . . .

"When the growing earth reached a mass sufficient to control the flying molecules of atmospheric material, there were two sources from which these could be supplied for the accumulation of an atmosphere, an external and an internal one. . . .

"In the later stages of organisation, and thence down to the present time, the molecules discharged from all the bodies of the solar system were possible sources of atmospheric accretion. Of these the most important were probably volcanic, and similar discharges from the small bodies that could not hold gases permanently, and discharges from the sun by virtue of the enormous explosive and radiant energies that are there resident.



"As the planetesimals were gathered into the growing earth-nucleus they carried their occluded gases in with them, except as the superficial portion might be set free by the heat of impact. There was thus built into the growing earth atmospheric material.

"The gases chiefly occluded in meteorites and the crystalline rocks are hydrogen, carbon dioxide, and carbon monoxide in leading amounts, and marsh-gas and nitrogen in small quantities. It is assumed that the gases of the aggregated planetesimals, and hence those of the interior of the early earth, were of the same order of abundance.

"In determining the actual proportions of the constituents of the early atmosphere, the abundance of the supply was probably less decisive than the power of the earth to hold the individual gases. As gravity gradually increased by the growth of the earth from an incompetent minimum, its power to control the heaviest molecules with the lowest velocities was acquired before its ability to hold the lighter ones of higher velocities.

"Carbon dioxide would be held some appreciable time before oxygen, and still longer before nitrogen, and all these a notable time before the vapor of water. The inference is that the initial atmosphere was very rich in carbon dioxide, for an abundant supply was correlated with a superior power of retention.

"The amount of oxygen in the early atmosphere is more uncertain, from doubt as to a competent source of supply . . . For the primitive atmosphere there is theoretical need for only enough oxygen to support the primitive plant life until it could supply itself, after which it would produce a surplus . . .

"After the earth acquired the power of holding water-vapor, the supply being abundant, accession doubtless went on for a time as fast as the capacity to hold increased.

"The problem of vulcanism assumes a quite new aspect under the planetesimal hypothesis, if very slow accretion without very high temperature be assumed. It has been taken for granted in the preceding statement that there was volcanic action. It is necessary, therefore, to consider how volcanic action may have arisen, and this involves the more radical question how the high internal temperatures of the earth may have arisen if the earth did not inherit its heat from a molten condition arising from a gaseous origin . . .

"The chief source of internal heat is assigned to the progressive condensation of the growing body as material was added to its surface. The amount of this condensational heat for the full-grown earth, computed on the best data now available, seems to be ample to meet all the requirements of the known geologic ages . . . That heat arising from condensation *solely* would reach the melting temperature of rock in a body one-twentieth of the earth's mass, seems more or less doubtful, but in a body one-tenth of

the earth's mass the required conditions would probably be reached.

"Pressure itself is probably incompetent to melt rock substances that shrink in solidifying, but the high temperatures generated by pressure in the deep interior were constantly moving outward into horizons of lower pressures, where the melting-points were lower. As the computed temperature at the center of the adult earth is about 20,000° C., there would seem to be no lack of heat, in the later stages at least. The essence of the problem lies in its redistribution and in its selective action.

"The material of the interior was originally, by hypothesis, an intimate mixture of planetesimals of various kinds, with such gaseous material as they carried in or entrapped in the process of growth . . . The outward flow of heat in such a mixture must bring some parts to fusibility much before the melting-points of other parts were reached. Local spots of fusion must thus arise. To this fusion the entrapped and occluded gases may be presumed to have contributed and to have joined themselves to the fused masses, and to have aided in giving them fluidity . . .

"It is not necessary to the hypothesis to suppose that volcanic action was an essential preliminary to the acquisition of an atmosphere, for the initial atmosphere may have been supplied from external sources. The apparent vigor and the wide prevalence of volcanic action on the moon, if its pitted surface means vulcanism, as well as the glassy material found in meteorites, whose origin is referred preferably to small atmosphereless bodies, favors the view that the internal gases were given forth abundantly before the earth grew to a mass sufficient to hold them. If this were true, an ample source of atmospheric supply was ready and waiting when the earth first acquired sufficient gravity to clothe itself with a gaseous envelope.

"When the increasing water-vapor of the growing atmosphere reached the point of saturation, it is of course assumed to have taken the liquid form and become a contribution to the hydrosphere. . . .

"If it be assumed that the earth's growing hydrosphere appeared at the surface when our planet had attained the mass of Mars, whose radius is about 2,100 miles, the subsequent growth would form a shell about 1,900 miles thick. It is not altogether certain that Mars bears water bodies on its surface, but the areas of greenish shades environed by a surface generally ruddy, the polar white caps ('snow caps') that come and go with the seasons, and the apparent occasional presence of clouds, not to appeal to the evidence of aqueous absorption lines in the spectrum reported by some good observers, but unconfirmed by others, lend some support to the opinion that water is present, though perhaps not in the form of definite water bodies. . . .

"Without attempting to fix the precise stage, it is not unreasonable to assume that surface waters had begun their accumulation upon the earth's exterior while yet it lay 1,500 to 1,800 miles below the present surface. The present difference between the radii of the oceanic basins and the radii of the continental platforms is scarcely 3 miles, on the average; so that if the continental segments be assumed to be in approximate hydrostatic equilibrium with the oceanic segments to-day, as seems highly probable, the selective weathering process brought about a difference in depression of only 1 mile in 500 or 600 miles, or about one-fifth of 1 per cent. . . .

"Not only is the evolution of the great abyssal basins and of the continental platforms thus assigned to a very simple and inevitable process, but there is therein laid the foundation for subsequent deformation of the abyssal and continental type.

". . . A theoretical scantiness of time for a prolonged evolution previous to the Cambrian period has been deduced from a molten earth, but this does not apply to the planetesimal hypothesis. The supposed limitation of the sun's thermal endurance would apply if the arguments could be trusted, but their foundation has been cut away by recent discoveries. It is not the least of the virtues of the planetesimal hypothesis that it opens the way to a study of the problem of the genesis and early evolution of life free from the duress of excessive time limits and of other theoretical hamperings, and leaves the solution to be sought untrammelled, except by the conditions inherent in the problem itself, which are surely grave enough.

"It is assumed that the conditions on which life is now dependent were prerequisites to its introduction. As already indicated, an atmosphere and hydrosphere sufficient to sustain life may have been acquired when the earth was about the size of Mars, or one-tenth grown. If, to be conservative, a preliminary growth of twice this amount be allowed, there still remains between this and the Cambrian record the growth of four-fifths of the mass of the earth. So far, therefore, as atmosphere and hydrosphere are concerned, life may have been introduced early in the history of the earth, and may have had a vast interval for development previous to the earliest legible record. There is another essential condition—a sufficiency, but not an excess, of heat and light. If the formation of the parent nebula involved only the outshooting of a small fraction of the ancestral sun, the solar supply of heat and light may not have been so seriously disturbed as to have fatally affected its availability to furnish what was necessary for life at any stage of the earth's growth. . . .

" . . . There is little ground for apprehension that the infalling planetesimals would be seriously dangerous to the early forms of life, for in the first place the atmosphere must have been

then, as now, an effective cushion, checking the speed of the planetesimals and partially dissipating them, and, in the second place, the early organisms were probably all aquatic and were further protected by their water covering. . . .

"So soon as plants and animals had come into action, all the great factors potential in the earth's physical evolution were in play.

"By hypothesis, volcanic action only began some time after the beginning of the earth's growth, for it was delayed (1) by the lack of sufficient compression in the central parts to give the requisite heat, and (2) by the time required for this central heat to move out to zones of less pressure, where it would suffice to melt the more fusible constituents. But, once begun, it is supposed to have gradually increased in actual and in relative importance until it reached its climax. This obviously came much later than the climax of growth, for it was dependent on the growth to give the increased compression from which arose the central heat on which the vulcanism depended. . . .

"The formations of this period of volcanic dominance, with very subordinate clastic accompaniment, are regarded as constituting the Archean complex, though perhaps only the later portions of the great volcanic series are represented by the *known* Archean."

To give a satisfactory statement of Professor Chamberlin's exceedingly interesting and elaborate theory has thus required very large quotation from his recent publication of it. Only by such direct presentation of his work in his own words could justice be done to this new nebular theory, to which this eminent glacialist was primarily led by his endeavours to explain the causes of the Ice Age, and of its several waxing and waning stages, by periodic changes in the content of carbon dioxide in the atmosphere. Having been an assistant under his direction on the United States Geological Survey during seven years in my work on the Glacial Lake Agassiz, it is with great pleasure and pride that I can claim for him and for America the distinguished honour of having developed this great theory of the origin of the earth. It will certainly introduce into geology and geophysics many new and fruitful methods of observation and research. Indeed, nearly all the great fields of theoretical geology now require renewed investigation, by which the planetesimal hypothesis shall be tested.

An earlier address by Professor Chamberlin, partially setting forth his studies in this direction, was given before the Geological Society of America, in Washington, D.C., on January 1, 1903, entitled "Origin of Ocean Basins on the

Planetesimal Hypothesis"; but only a very brief abstract or note of this address was published.\*

From the oral statements in this and other unpublished addresses, Professor Herman L. Fairchild, Secretary of the Geological Society of America, presented on January 1st, 1904, at the sixteenth annual meeting of that society, an able discussion of the geologic bearings of the new hypothesis.†

The recent detailed publication of it, in *Year Book No. 3 of the Carnegie Institution*, from which I have so largely quoted, has no diagrams or other graphic illustrations; but such desirable aids for the more definite development of the subject, with ample treatment of its relations to geology, are intended to be published soon, in the second volume of a geological text-book by Professors T. C. Chamberlin and R. D. Salisbury, whose first volume of this work was issued early last year.‡

Chamberlin has contributed greatly to the establishment of an acceptable nebular theory, consistent with the known relations of the planets, their satellites, and the sun, by his derivation of the solar system from a spiral nebula, and by his indicating the probable mode of origin of such nebulae, which abound by tens of thousands throughout the starry heavens, as discovered by the most powerful telescopes.

Both the meteoritic hypothesis of Lockyer and the planetesimal hypothesis of Chamberlin seem to me probably true in their regarding the nebulous matter from which planets and suns are made as having become mostly solid, though finely divided, and as very cold, being in almost absolutely cold and immensely extended space, previous to the condensation and segregation which formed it into worlds and stars.

During the accumulation of the planets and their satellites, much or perhaps nearly all of the nebulous matter forming them had remained, until thus gathered as great bodies, apparently in solid and cold molecules or in small masses brought together by their gravitative attraction, as seems reliably evidenced by the rings of Saturn and by the many little asteroids.

\* *Bulletin Geol. Soc. America*, vol. xiv, p. 548, March, 1904; and *Am. Geologist*, vol. xxxii, p. 14, July, 1903.

† "Geology under the Planetesimal Hypothesis of Earth-Origin," *Bulletin Geol. Soc. America*, vol. xv, pp. 243-266, published June 23, 1904; and *Am. Geologist*, vol. xxxiii, pp. 94-116, Feb., 1904.

‡ *Geology*. In two volumes. Vol. I. *Geologic Processes and their Results*, New York, Henry Holt and Co., 1904, pp. xix, 654.

Coming to the question whether the accumulation of so large a body as the earth took place without its becoming intensely hot and molten, somewhat like the sun, we have first the observations and theories of geology to aid in giving an answer, and these may be advantageously supplemented by the physiographic features of our satellite, the moon. It has been long held by geologists that the downward increase of heat in the earth's crust, present volcanoes, the widely distributed evidences of ancient volcanic action, and thermal metamorphism of great rock formations, indicate an internal temperature which must fuse any known rocks, unless they are prevented from this by overlying pressure. The new hypothesis of Chamberlin accounts for vulcanism, and for all that we know of the earth's internal heat, fully as well as the Laplacian hypothesis of condensation of an intensely hot gaseous nebula, while it better accords with the physical and dynamic relations of the planets and sun.

If our inquiry be turned to the moon, we see a most wonderful record, as it is generally regarded, of extinct volcanic action, implying a formerly very hot and probably almost wholly molten state of that globe, which has a little more than one-fourth the diameter of the earth. These two companion globes were doubtless accumulated similarly. The moon, after acquiring its present size, had multitudes of volcanoes which left round craters, or parts of their crater rims, of varying dimensions from those at the limit of telescopic vision up to one with a diameter of about 800 miles, or nearly four-fifths of the moon's radius. So great a lake or sea of molten rock, similar to the calderas of the Hawaiian volcanoes, but of vastly larger area, whose crater rim is partially preserved in the lunar Carpathian-Apennine-Caucasus chain of mountains, could only exist when much of the interior of the moon was melted. It seems possible and indeed probable, therefore, that the earth, whether formed as supposed by the old or the new nebular hypotheses, was nearly or quite all melted during a considerable part of the time of its accumulation. The planets undoubtedly tended in some degree toward the same intensely hot condition, which is reached by the sun and stars in the concentration of originally nebulous matter.

But another explanation of the origin of the very abundant small and large crateriform features of the moon has been advocated by G. K. Gilbert, of the United States Geological

Survey.\* This very remarkable and ingenious explanation seems largely identical with the later planetesimal hypothesis of Chamberlin, so far as that hypothesis deals with the segregation of the originally nebulous matter to form planets and satellites. Mr. Gilbert writes:

" . . . It is my hypothesis that before our moon came into existence the earth was surrounded by a ring similar to the Saturnian ring; that the small bodies constituting this ring afterward gradually coalesced, gathering first around a large number of nuclei, and finally all uniting in a single sphere, the moon. Under this hypothesis the lunar craters are the scars produced by the collision of those minor aggregations, or moonlets, which last surrendered their individuality.

" . . . The introduction of the hypothesis of a Saturnian ring thus accomplishes much toward the reconciliation of the impact theory with the circular outline of the lunar craters. . . .

"In fine, the hypothesis of the Saturnian ring, by restricting the colliding bodies to a single plane, by substituting a low initial velocity and thus rendering the moon's attraction the dominant influence, and by introducing a system of directions controlling, and therefore adjusted to, the moon's rotation, relieves the meteoric theory of its most formidable difficulty. It also explains in a simple way the abundance of colliding bodies of a different order of magnitude from ordinary meteorites and aërolites. . . .

"The velocity of impact, depending chiefly on the moon's attraction, must be supposed to have increased gradually as the moon grew. In the closing stages of the process it did not vary greatly on either side of one and one-half miles per second, and the phenomena of the present surface may be discussed on the basis of that velocity. The energy due to that velocity would more than

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\* "The Moon's Face, a Study of the Origin of its Features," address as retiring President, delivered December 10, 1892, *Bulletin of the Philosophical Society of Washington, D.C.*, vol. xii, pp. 241-292, with one plate and 14 figures in the text; published April, 1893.

Referring to early suggestions of meteoric accumulation of the moon, and of other cosmic bodies, Mr. Gilbert said in this paper (1892): "I have discovered no published statement of meteoric theories more than twenty years old, but the idea is older and various obscure allusions indicate that it was earlier in print. Proctor makes a meteoric suggestion in 1873 (*The Moon*, p. 346), and advocates it in 1878 (*Belgravia*, vol. xxxvi, p. 153). A meteoric theory is said to be contained in *Die Physiognomie des Mondes*, by 'Asterios,' Nordlingen, 1879. A. Meydenbauer advances another in 'Sirius,' for February, 1882."

With these publications, compare *The Meteoritic Hypothesis*, 1890, by Lockyer, before cited, and a most important paper by Prof. George H. Darwin, "On the Mechanical Conditions of Swarms of Meteorites and on Theories of Cosmogony," *Phil. Trans. Royal Society*, 1888.

suffice . . . to melt the moonlet if it were composed of ordinary volcanic rock, and provided all of the energy were applied to the heating of the moonlet. Practically only a portion of it was thus applied; another portion produced heat in the contiguous tract of the moon's material; yet another was consumed in the deformation of moonlet and moon resulting in the crater, and another resulted in modifications of the moon's motions, changing its orbit, its orbital velocity, its axis, and its rotational velocity. The energy converted into heat might be regarded as the remainder after deducting all other effects, and the resulting temperatures would be further conditioned by the distribution of heat in the colliding masses.

"Since the area of the moon's surface directly struck by the moonlet is a function of the square of the diameter of the moonlet, while the energy applied to that area, being measured by the mass of the moonlet, is a function of the cube of its diameter, more energy would be applied to a unit of space in the case of large moonlets than in the case of small, and the temperatures caused by large moonlets would therefore be greater. To this relation I ascribe the restriction of inner plains, indicative of fusion, to the larger craters.

"In the breaking up of the postulated pre-lunar ring there were at first many centers of aggregation—were the moon the only center, the scars of impact would all be small. So long as the masses were small the process of aggregation developed little heat, for the heat of impact depended almost wholly on velocities created by mutual attractions. That particular moonlet which became the nucleus of the moon may therefore be conceived as cold, or at least as sufficiently cool to be solid. As the moon's mass grew, the blows it received were progressively harder, and for a time their frequency also increased. The rate of heating probably reached and passed its maximum while the mass was materially less than now. During the whole period of growth the surface lost heat by radiation, but the process of growth cannot have been slow enough to permit the concurrent dissipation of all the impact heat. On the one hand, there should have been some storage of heat in the interior, and on the other hand, the stored heat can never have sufficed for the liquefaction of the nucleus. Toward the close of the process, when blows were hard but rare, liquefaction was a local and temporary surface phenomenon, but the general temperature of the surface was low. Impact heat, being evolved simultaneously in the surface and the subsurface, was dissipated more rapidly from the surface, so that there was a subsurface zone of relatively high temperature. The zone thus inferred deductively is also inferred inductively from the disparity of cavities and rims in the case of large craters; but, on the other hand, there is little evidence of the wrinkling which, theoretically, should result from the



adjustment of a cold crust to a cooling nucleus. . . . It is therefore probable that the final shrinkage of nucleus was small, and the antecedent storage of heat correspondingly small. During the whole period of growth the body of the moon was cold."

After thus stating the hypothesis of Gilbert for the origin of the moon, in his own words, it is not needful to consider here in detail the numerous arguments which favour vulcanism, instead of impacts, as the cause of the moon's craters. The adoption of Gilbert's explanation of the physiography and development of the moon would go very far toward conclusive verification of the planetesimal hypothesis; but Chamberlin evidently thinks that volcanic origin of the lunar craters is more probable.

Gilbert considers the whole process of the moon's gathering its formerly scattered material to have been completed at least before the deposition of the earth's Paleozoic sediments, else they would here and there reveal evidences of collision of some of the portions of the previous ring matter, since these must have fallen not only on the moon but in like manner on the earth. Whether the craters of the moon resulted from meteoric aggregation or from vulcanism, the very steep and high mountains of the crater rims have doubtless remained through very long ages unaffected by agencies of erosion, because of the absence of atmosphere.

Geologic antiquity, as hitherto studied, falls far short of reaching back to the time of completion of the creation of these companion globes, the earth and its satellite, in nearly the same size and conditions which they have now. But in the new views opened by the hypotheses noticed in this paper the range of geologic inquiries and theories is extended almost inconceivably farther back, through the laying of "the foundation of the earth."

#### DISCUSSION.

Colonel MACKINLAY.—I understand Mr. Gilbert tells us on page 202, that what we call volcanoes in the moon are masses roughly comparable to the belt left on a wall when a snowball strikes it, and not volcanoes at all. I must confess it has always struck me as a very strange thing that the moon, which is so much smaller than the earth, is so much richer in volcanoes, and that they should be so very much larger than terrestrial ones. I never heard anyone give

an explanation of this difference. I think it is very difficult to believe they can be volcanoes at all, and I am glad to think there are theories to account for the mass of rings on the moon's surface.

The SECRETARY.—Sir Robert Ball and myself and my son paid a visit several years ago to the Auvergne district of Central France, a district of recently extinct volcanoes, and he made that journey with the special purpose of observing the extinct volcanoes and their apparent similitude to those of the moon. I am sure Sir Robert Ball is a strong believer in the crater-like forms on the moon's surface as being volcanic. They are very deep depressions because the shadows are deep. The terrestrial ones are smaller than the moon's, but some of those in the Pacific Ocean, the great volcanic islands—are of enormous size—six or seven miles in diameter.

Mr. ROUSE.—It occurred to me that the impression made by a snowball upon another ball, or upon a wall for that matter, would not have been like that of the volcanic walls on the moon, because there would have been an inward slope as well as an outward, whilst they present the appearance of a perpendicular wall without. If any soft body is hurled against another there will be an inner slope of considerable deposit. There will be an inner very considerable slope greater than the outer.

Then it has also occurred to me that if the moon itself was in at all a soft condition, as we may suppose it was at that time, that there would be also a depression in the moon—not only a flat appearance which looks like the continued level of the moon inside the volcanic wall, but there would be a hollow.

The SECRETARY.—There is one difference between the extinct volcanoes of Auvergne and those of the moon. In Auvergne the lava flows break down the walls of the circle, which is generally formed of volcanic ash, but through which molten lava is coming up and filling the great bowl gradually up. It has broken down that rim in some places of least resistance, and then you have a stream flowing out for several miles, and so little covered with vegetation that you might think it was only a few years since they had ceased to flow.

Rev. JOHN TUCKWELL, M.R.A.S.—It will not be possible for us to spend time enough to discuss this nebular hypothesis to anything like its full extent.

There are great difficulties in the way of the acceptance of this new hypothesis when compared with the older hypothesis, more or less modified, of Laplace. Matter in its original condition was no doubt extremely attenuated, and in this extremely attenuated condition it hardly appears possible for us to believe that it was heated. The temperature of cosmic space I think is said to be something like 460° or 470° F. below zero. When we look upon such objects as comets, their tails, which consist of matter in an extremely attenuated condition, certainly cannot be regarded as a fire mist or anything of that kind. With regard to its motion the rotating and spiral nebulae are certainly very suggestive of the original motion which resulted in the formation of the central sun and planets. I do not think it is necessary to the older hypothesis that we should suppose that the whole mass of the original nebulae formed into one compact whole with a flattened surface. We may still accept it together with the suggestion made here, that various nuclei became formed. But when we go right back to their origin, and to the character of the original motion of the nebulae upon either hypothesis, we come to that state of things when we are obliged to suppose the assertion of the Infinite Will, and the Infinite Wisdom of an Infinite Person. We know of no source whence force could originate except in will. Force may be transformed from one nature or condition to another, but force so far as we know could only originate in will; and thus in the origination of force there is no correlation between the power of the will—the assertion of the power of the will, and the effect produced. In the case of the nebular hypothesis, as we have been accustomed to think of it, you have evidence of the original gaseous condition of matter. This gaseous or nebulous condition may have preceded the granular state, if I may so call it, suggested by the hypothesis of Mr. Chamberlin. It is only necessary to apply a few simple laws of Nature to see at all events how development into subsequent conditions *might* have taken place from matter in its original and gaseous condition. I suppose in that original condition we must regard it as having been atomic. But whether these atoms were the atoms of one primitive substance or atoms possessing different qualities we do not know. By some means or other these atoms must have become combined into molecules, but by what means we do not know. That it did take place at some time or other must be taken for granted.

Then with regard to the formation of the planets out of the mass rotating around its central orb, which ultimately became our sun, we may perhaps blend the two hypotheses and suppose that various nuclei were formed which ultimately became planets. Then comes in the question of heat. When was heat evolved? There are two ways by which it might have been produced. Heat may have been produced spontaneously by the closer contact of the original atoms or molecules of the planets, for everyone knows that the closer the atoms or molecules of any substance are driven together the greater the heat is which is evolved. But another means is possible. We have recently had evidence of the way in which a gaseous world can become suddenly ignited. Some two or three years ago there was a world observed, since known as *Nova Persei*, which suddenly became incandescent. How this took place we do not know. Sir Robert Ball suggested that it may have come into contact with some other planet or with some large meteorite, and that the impact produced ignition.

Professor LOBLEY.—The subject of this paper to-day is an illustration of the very great activity of scientific men on the other side of the Atlantic, and especially is this the case in the subject of astronomy. During the last two or three decades the American astronomers have achieved very great results. It seems to me that this in a great measure is due to the support given by the rich men of America, and it is an example to the rich men of this country, if we wish our country to maintain its place in the van of science.

There are very many points in this paper; it bristles with points suggestive of remarks. It cannot be adequately discussed in a short time, but may I venture one or two remarks about one or two points?

I would like to refer to what has been said with regard to the theory of the rings on the moon being caused by impact. It seems a difficult thing to imagine that these were induced by a moonlet. Where has the moonlet got to? The moonlet did not sink into the moon and there is no evidence of its presence. If it had sunk into the moon it would have left a hollow. Professor Hull has very well referred to the remarkable region of Central France in which you have a number of extinct volcanoes. There is another region in Europe which even more resembles the moon's surface, and that is the Phlegræan fields near Naples, where you have a number of

craters quite resembling the moon's craters, but not on the extensive scale of the moon's surface, although a number of the craters on the moon's surface are small.

With respect to the large question of the nebular hypothesis I confess I must coincide with Mr. Tuckwell. It seems to me that Laplace's idea of a heated nebular mass is quite out of the question in cold regions of space. I quite conform to Mr. Chamberlin's theory of the mass being elemental, as it were, and that these atoms combined together would form molecular solids, and thus we get Mr. Chamberlin's original nebulae. These would unite together and form a central nucleus, and attract more and more of those surrounding them, and thus rapidly grow.

With respect to the growth of the earth, as stated in this paper, I really cannot follow Mr. Upham. He speaks of primitive atmosphere when the earth was only half or less than half the size that it is. There was a gradual growth of the earth from that small mass to the greatness of a planet. In a nebula, such as he assumes, a great number of small bodies that formed one mass would be aggregated to a very considerable size. It could draw and unite others and it would grow to its maximum dimensions in a very short time. It would not require enormous ages for bodies one after another to come into it, and it would rapidly aggregate to itself all that was available for it, with the exception of any small masses which are coming in down to the present day.

With regard to the volcanic hypothesis I must say that something is wanting. The two writers seem to assume that the cause of volcanic heat is internal heat, the central heat of the globe. I have disputed that for a long time. It is practically impossible for volcanic lava to come from 30 miles below the surface. It is impossible for lava to penetrate through solid rocks for that distance; and lava is not due to the central heat of the globe.

There is no mention in this paper of rock-fusing temperature except this. This rock-fusing heat is induced by internal heat, but when it produces the chemical action—which again produces heat—you have a rock-fusing temperature obtained at a very short distance below the surface; and the lava comes from a very short distance below the surface, three or four miles at most.

I will conclude by stating that this is in my opinion an exceedingly important, because a most suggestive, paper, and will give, I think, an impetus to a great amount of thought on this very important subject.

Professor ORCHARD wished to express his entire agreement. I must say I thoroughly agree with what the author says on the first page, that the physical laws of nature are Divine methods of working, and with what he says on the second page, that "to learn continually more and more of God's thoughts as revealed in His works, is the highest reward of the student of nature." It reminds me of the words of Keble, "I thank Thee, O God, for letting me think Thy thoughts after Thee."

The SECRETARY.—I trust you will allow me to be the medium of conveying the thanks of the Institute to Mr. Upham, for this exceedingly important and interesting paper. He was a short time ago elected Honorary Member of the Institute, and in conveying that information to him, which was exceedingly gratifying, as he had long been what the French call *effectif* member, I coupled it with the provision that he should send us a paper for this Session, and notwithstanding that he has on his hands an enormous amount of work, he very kindly sent me the offer of two subjects, and this is the one which I selected. I am not at all sorry that it is the one I selected, and I shall be very pleased in sending him our warmest thanks.

As regards Professor Chamberlin's theory, while recognising its originality and interest, it seems to me to fail in giving a cause for the dominant forces of rotation and revolution by which the solar system is governed. Given the planetesimal conditions, we have to assume the force of gravitation in order that the "little planets" should congregate round centres of attractions; and in order to form planets rotating and revolving in space. There must have co-existed an impulse causing rotation round an axis, and revolution round a central sun; but there does not appear to be any explanation of the origin of these movements in Professor Chamberlin's theory. Nor do I feel disposed to accept the new theory for that of Laplace and Newton regarding the origin of our planet. The form of the earth (that of an oblate spheroid) is very suggestive of an originally molten condition from heat, and geological observations tend to support this view. The objection of

Mr. Tuckwell to the idea of highly heated matter revolving in the low temperature of space can scarcely be reconciled with the existence of the sun surrounded by space, and while agreeing with Professor Lobley that volcanic action does not originate at great depths below the earth's crust, there are zones of matter in a molten condition due to intense heat or otherwise, how could we account for the eruption of basaltic lavas (of several varieties it is true, but essentially similar in composition) at widely distant places over the whole globe for example, the British Isles, Central Europe, Sicily, India, America and Iceland?

#### COMMUNICATIONS.

From Rev. A. Irving, B.A., D.Sc. —

Regretting my inability to be present at the reading of Mr. Warren Upham's paper on the "Nebular and Planetesimal Theories of the Earth's Origin," I beg to offer a few remarks as brief as possible thereupon.

Starting with the "protyle" (or prothyle) hypothesis of Sir William Crookes, F.R.S., I have preferred to regard the nebulous matter as entirely in its origin non-differentiated; while it is to the teaching of the "periodic" or natural system of the elements (now so well known to chemists) that we must look for light upon the genesis of the elements (so far as they are known) out of which our planet, with its four components, the barysphere, the lithosphere, the hydrosphere and the atmosphere, is made up. We thus suppose a stage at which the nebulae consisted of matter in a state of elemental dissociation. By integration of the atomic matter further differentiation proceeded, gravitation came into play as a nucleus was formed with transformation of potential energy into heat, with its expansive force, and dissipation of that energy into space by radiation. These briefly—it is here submitted—are sufficient to account for the inorganic evolution of the globe, when we take into account the selective action of the chemical affinities of the atoms. From such general data I attempted to work out in the "eighties" an outline of the history and genesis of the present order of inorganic nature as that presents itself on our planet, in accordance

with *evolutionary law*. This formed the fundamental idea of my graduation thesis for the Doctorate in Science, which was submitted to the University of London in 1888, and was published with considerable additions by Messrs. Longmans and Co., in 1889, under the title of *Chemical and Physical Studies in the Metamorphism of Rocks*. The conception, which I was thus able to form of the evolution of this globe, would seem therefore to have anticipated, by a decade or more, a good deal that Mr. Upham has brought forward in the latter part of his paper. I have returned to this subject of late, and have already in MS. a little work nearly ready for the press, in which stress is laid upon the confirmation given to my published views by the "spiral nebulæ" during the last three or four years. This flashed upon my mind, when I had the great pleasure of listening to Sir Robert Ball's splendid address to the Victoria Institute in 1903, and of seeing the photographs which on that occasion he threw upon the screen.

In the work, whose title is given above, will be found a *discursus* (pp. 22-24) on the results that would follow from the assumption of the following laws and principles:—

1. The law of universal attraction, and the specialised operation of this law in all cases of gravitation.
2. Elevation of temperature, when latent heat is set free either in the liquefaction of aeriform matter or in the solidification of liquids.
3. Transformation of potential energy due to chemical affinity into heat in chemical combination.
4. Dissipation of energy, as it is transformed into heat.
5. Transformation of energy into heat in all cases of impact.
6. Retardation of radiation by non-diathermanous gases and vapours.
7. The enormous range of condensation-temperatures of the known chemical elements from that of platinum, osmium or ruthenium to that of hydrogen gas.

In the second appendix to the above work there appears also a *discursus* on the moon's surface, as throwing light upon the conditions of our planet in the pre-oceanic stage of its development.

This has also been discussed more recently by Professor Suess of



Vienna in his little monograph, "Ueber den Mond" (*Sitzungsberichten der Kaiserlichen Akademie der Wissenschaften in Wien*). In his "Rede Lecture" before the University of Cambridge in 1893, Professor Bonnéy, F.R.S., has confirmed a good deal that was contained in my previous work; so also has much that is contained in Lord Kelvin's address to the Victoria Institute in 1897.

I am inclined, upon the whole, to look upon the Huronian phyllites and Grauwacke (as the late Roland D. Irving has described them)\* as furnishing the record of the beginning of the hydrosphere; though, as I have pointed out in my book (pp. 54-55), traces of water may have been caught up in the formation, under great atmospheric pressure, of such basic minerals as hornblende, muscovite, etc., of the earlier crystalline schists, even in the pre-oceanic stage; an hypothesis, which has received experimental demonstration since from the splendid work of M. de Kroustchhoff of St. Petersburg in the synthesis of such minerals (see *Nature*, vol. xliii, p. 545). With the glimpses we thus get through the æons of the past, we may well agree with the concluding remark of Mr. Upham's paper, when he says, "In the new views opened by the hypotheses noticed in this paper the range of geologic inquiries and theories is extended almost inconceivably further back, through the laying of the foundations of the earth." Only, as I could show more fully if space permitted, *those views have not quite the novelty which he seems to claim for them*. It is pertinent also to remark that Mr. Upham has done good service in bringing them forward in the way he has done, and thus driving another nail or two into the coffin of the Hutton-Playfair-Lyell Uniformitarian dogma. (See remarks by myself in the *Geol. Mag.* for June, 1892, with quotation from Lord Kelvin on "Dissipation of Energy.")

I see no reason for unsaying what I wrote in 1888, when I said, "The Archæan stage of the earth's history is seen to fall into a place in a natural order of development, and one more chapter is added to the history of the operation of the great Law of Evolution, which is written upon all created things. As the mists and clouds thus disperse, our intellectual vision begins to descry a boundary to geologic time, and the physical geologist begins to feel that over

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\* "Is there a Huronian Group?" (*Amer. Journ. of Science*, vol. xxxiv.)

this question he can join hands with the astronomer and the natural philosopher." (*Op. cit.* p. 97.)

Hæckel and his school may claim all that for their "Monism"; but I hope we may see that it is all included in that still higher monism which is involved in the theistic conception of creation contained in the Bible.

From Rev. J. RATE, M.A.:—My dear sir, I have read with interest Mr. Upham's paper on Laplace's Nebular Hypothesis. He says that R. A. Proctor asserts that there is an improbability of the existence and permanence of the rings of Saturn as either solid or liquid. This must have been written before the discovery of the dark inner transparent ring next to the body of the planet, seen by Laplace in his reflector, and by Dawes in his achromatic, and by Sir David Brewster in Lord Ross' great reflector. Sir David says, *Optics*, p. 499, "I have enjoyed the great privilege of seeing through this noble instrument the satellites and belts of Saturn, the old and *new* ring which is advancing with its crest of waters to the body of the planet." "Laplace has already discovered the transparency of the *new* ring of Saturn," Brewster's *Optics*, p. 500.

"We understand that this telescope" (Rev. M. Craig's achromatic) "exhibits satisfactorily the *new* ring of Saturn, which Laplace and Dawes have found to be transparent, as the body of Saturn is seen through it, but that the correction for spherical aberration in that of Mr. Craig's is not perfect, and that it is necessary to stop the central part of the object glass." Sir D. Brewster's *Optics*, pp. 507-8.

I myself spent a clear night in 1852 with Lord Ross at his great 6 feet (in diameter) reflector, of 57 feet focal length, in which I saw nebulae which had never before been seen by mortal eye—except in that telescope, and, in his 3 feet reflector, of 26 feet focal length, I saw the planet Saturn with his rings.

I thank you much for sending me the proof of Mr. Upham's paper, and for your able fulfilment of the duties of Secretary to the Victoria Institute.

## ORDINARY GENERAL MEETING.\*

MR. W. H. HUDLESTON, V.P., F.R.S., IN THE CHAIR.

The following election was announced :—

MEMBER :— Richard Bangay, Esq., M.D.

The CHAIRMAN then called on the Secretary, Professor HULL, F.R.S., to read his communication.

*ON DR. NANSEN'S BATHYMETRICAL RESEARCHES  
IN THE ARCTIC OCEAN AS COMPARED WITH  
THOSE ON THE ATLANTIC COAST OF EUROPE.*  
By Professor E. HULL, LL.D., F.R.S., Secretary.

Professor HULL.—Mr. Chairman, ladies and gentlemen, I must ask your indulgence if I am not in very good condition for the address which I am about to give, because I am only just recovering from rather a troublesome and weakening malady. But I have also to explain why it is I address you at all this evening. On the programme for the Session a paper by Dr. Peebles of America was down, on a most important subject, that of *Immortality*, and Dr. Peebles intimated that he intended to be present to read it. We waited until the last day on which it was necessary to send out notices of the paper, for the paper of Dr. Peebles, but neither the paper or its author arrived until to-day. I believe Dr. Peebles is here, and I am sure as an old and respected Member of the Institute, we all welcome him from across the Atlantic. (Applause.) However, I had to fill the gap ; and having had the pleasure of

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\* Monday, April 3rd, 1905.

*To face page 214.*

**MAP OF THE NORTH POLAR OCEAN AND BORDERING LANDS WITH THE  
CONTINENTAL PLATFORM INTERVENING.**



- A. Arctic Ocean.
- C. Continental shelf with steep outer margin breaking off into the  
abyssmal ocean.
- G. Greenland.
- I. Iceland.
- S. Siberia with rivers entering the sea.
- N. Norway.
- G. S. Greenland Sea.



listening to Dr. Nansen at the meeting of the Royal Geographical Society on Tuesday last, and hearing the statement of his discoveries in the Arctic Ocean and along the coast of Norway, it occurred to me that it might be interesting to you if I was to give you (in brief) some account of these discoveries in connection with those which we ourselves have already considered at the meetings of the Institute. I have therefore prepared this communication, which is entirely extempore, and which will be illustrated to a certain extent by lantern slides.

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1. *The Atlantic border.*—Now for those present who have not previously had an opportunity of investigating the sub-oceanic physical features of the Atlantic, and the North Sea and Arctic Ocean, I have just drawn here on the board an outline of what these physical features are, in cross sections. They are really very simple in detail. They consist first of the sea margin of the Atlantic; then of a platform, the margin of which has generally a steep descent into the abysmal ocean; this is called "*the Continental Platform*," on which the continent of Europe and the British Islands and Norway are practically built. This great platform extends along the sea coast and westward to Greenland, and southward along the coast of Europe and Africa. Then we come to the outer margin of the continental platform, where the descent of the sea-bed down into the abysmal ocean, to a depth perhaps of 6,000 or 7,000 feet below the present surface, becomes steep and abrupt. But when we come to Norway we find there, according to Dr. Nansen's views, instead of having one platform coming out from the coast, there are really two; one being "*the coast platform*," which is just a little above or below the actual level of the sea, and which contains principally all the little islands which lie off the coast of Norway, between which and the coast cruisers and yachts can sail in smooth water, while outside there may be a stormy sea. This is the "*coast platform*," which is different from the continental platform, and probably of more recent origin. The continental platform has been recognised by the soundings as far south as the Congo and on northward into the borders of Europe.

Then, we come to the coast of Europe; here we have most beautifully defined river valleys, as for example that of the Tagus, coming down across the platform, and with their channels descending to about 6,000 feet below the level of the ocean.

Then, the Adour, which also, according to my investigations, certainly comes down to a similar depth, about 6,000 feet. Dr. Nansen in his work on the Polar ocean (vol. iv) when describing the Adour river valley, says: "it is almost impossible to give any other explanation of its existence than that of a former river valley at a time when the whole region was elevated into land." This, you will admit, is very valuable testimony.

Then we proceed northwards and find that the channels of several of the rivers entering the ocean from Spain and France are also continued out into the ocean across the platform, and descend almost to a similar depth as the base of the platform itself.

Similar is the case with the British Isles. In the case of one of the old river valleys, we have an illustration of a submerged valley in the English Channel; and it is remarkably determined and represented on the Admiralty Chart under the term of the "Hurd Deep." It is 60 miles in length, running up the channel parallel to the coasts, along the centre between the coasts, and it terminates towards the Straits of Dover, gradually dying out where we may suppose the river had its origin; it also dies out towards the western margin of the continental platform, doubtless owing to silting. The floor of the English Channel itself, and of the Irish Channel, are only parts of the great submerged plain of the continental platform; but this is a river valley cut out and left open to the present day, so that the Admiralty surveyors have marked it as the Hurd Deep, after the name of the naval officer who carried out the soundings whereby the river valley was discovered.

2. *The Arctic Ocean*.—Nansen's great discovery, partly from actual soundings, partly by inference based thereon, is the occurrence of a profound Arctic basin which, unless abruptly terminated by the uprise of a mountain mass several thousand feet in height from its floor under the pole, of which there is no evidence, necessarily extends under the pole itself. (See Plate.) This view is strongly supported by Professor Spencer in an able paper which has opportunely reached my hands\* in which the whole question is discussed—and which is illustrated by an excellent little map of the Arctic regions. In this map, which is to some extent based on that of Nansen, in his great work,† but also on original researches, it is shown how the continental platform

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\* No. 11 in the list of papers appended to this essay.

† *Bathymetrical Features of the North Polar Sea*, Christiania, 1904.

is in all probability carried right round the whole of the great polar basin from the coast of Norway, by Spitzbergen, Franz Joseph Land, the New Siberian Islands, the coast of Alaska, Prince Patrick and other Polar islands; then off Banks Land, by the north coast of Greenland and onwards by Iceland to the North Sea and the Scandinavian coast from which we started. On this platform or continental girdle, which seldom exceeds 600 feet in depth from the surface at its outer margin, are planted all the groups of Arctic and sub-Arctic islands, including Iceland, Spitzbergen, Franz Joseph, Nova Zemlia, New Siberia, those between Beaufort Sea and Baffin's Bay, and the British Islands themselves. The breadth of the platform is greatest between Spitzbergen and the Scandinavian coast, here inclosing the Barents sea; and off the coast of Siberia the average breadth is about 500 miles. On the other hand, off the coast of Spitzbergen and apparently adjacent to Franz Joseph Archipelago the shelf has a breadth of only about 30 miles; and is a little over 60 to 100 miles off the Archipelago of the Greenland sea, as far as can be conjectured from the few soundings available. But all the soundings made by Nansen and previous explorers go to show, that on reaching the outer margin of the shelf, the land descends rapidly to depths of about 6,000 to 7,000 feet and more. As is well known, Nansen's *Farthest North* was reached on the 7th April, 1895, in lat.  $86^{\circ} 13' 6''$  where the depth of the ocean reaches 3,000 mètres (9,780 feet) a depth which may be presumed to extend to the pole itself;—much too near to allow of the uprise of land of 10,000 feet in height within so short a distance.

On this subject we have an interesting statement from Professor Spencer, in which he says, "I was in northern Norway when the Ziegler expedition sailed, and hearing of their expectation of finding polar land, I felt that disappointment was in store for them; for Dr. Nansen's great discovery of a profound Arctic basin, immediately beyond the border of the continental shelf, precluded the probability of finding land between Franz Joseph land and the pole, or indeed along this line for a thousand miles beyond." The members of this expedition were doubtless unacquainted with the physical conditions of the Arctic region as now brought to light by the restoration of the old marginal land indicated by the continental platform and its deep basin adjoining.

It now only remains to observe that these Arctic sub-oceanic features resemble those of the coasts of Europe and America in being intersected by the channels of former rivers crossing



the platform from the present lands seawards, and deeply indenting the continental slope. Of these important features, Nansen gives numerous instances; the Barents Sea and the platform off the coast of Siberia afford numerous examples. From all of which we learn, that the platform itself was formerly a land surface traversed by rivers draining out into the Arctic Ocean, and sometimes continuous with the streams which drain the adjoining lands of the present day. The discovery of such "drowned river-valleys" within the Arctic circle, as also along both borders of the Atlantic Ocean, when fully grasped in all their significance, cannot fail to convince us of the great changes which the crust of our globe and the enveloping hydrosphere have undergone within recent post-Tertiary times.

#### DISCUSSION.

MR. HUDLESTON (CHAIRMAN).—I do not need to introduce Professor Hull to you. We are very much obliged to him for the interesting representation of these remarkable oceanic phenomena. I daresay that some of us remember the various papers we have had on these phenomena from the same author; but it is extremely interesting to me to be reminded of the existence of these features; and Professor Hull's object is to group all the features, all the sub-oceanic features, almost from the Equator to the Pole, as far as those features are known, and more especially on the eastern side of the Atlantic basin. It is in consequence of Dr. Nansen's visit to this country that Professor Hull has thought it desirable to reopen this subject, and it is a very useful opportunity for those who have not heard Nansen himself to have some idea of what he has been about of late.

Now I think that perhaps I might read one or two extracts from Nansen's remarks before inviting discussion upon the paper. It is the oscillation of the shore line which is the crux of the entire problem, and the amount of oscillation differs according to different views.

"It seems to be the common opinion that the continental coasts have been depressed at places and at other places elevated. I believe a thorough investigation must prove that this view is not correct. There are evidences that the mean level of the continental shore line has been very nearly the same for a long period.

"The coastal platform is a very characteristic feature, across the whole of the Norwegian coast, forming a belt of low islands. The coastal platform is situated about 100 mètres below present sea level and 100 mètres above . . .

"Its surface is nearly horizontal. It is a fact that a similar coast platform does not seem to exist along the coast of Finland. There it seems to be represented by raised terraces. Along the west coast of Scotland there is an imperfect coast platform.

"The continental shelf along the Norwegian coast varies greatly as to depth and width. It is in some places high and narrow, lying at a mean depth of 200-300 feet, while at other places it is very broad and deep, lying between 700-900 feet below sea level. The shelf must therefore have been in solid rock. . . ."

All these evidences prove that the shelf must be built up of rock and have only been cut by erosion. They are evidently built up by coastal deposition of waste.

(Other extracts read in full.)

Professor LOBLEY, F.G.S.—We owe our gratitude to the author for his interesting remarks. It is a question that he has paid great attention to for many years, and he has brought before the Institute several very interesting papers on the subject of submerged river valleys. The Chairman has also read some very interesting extracts from Nansen's writings, but it seems to me that Professor Hull's point of view is quite different from that of Nansen. Nansen in his statement dwells principally on the coastal platform and the continental platform. Professor Hull principally dwells upon the submerged valleys across these platforms, which Dr. Nansen does not refer to in the passages quoted.\*

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\* Professor Loble only refers to the passages above quoted, but Nansen, in his work, repeatedly points to the existence of deep river channels crossing the continental platform below the surface of the Arctic Ocean.—E. H.

The deduction that Professor Hull draws from these submerged valleys is that there has been an enormous oscillation of the vast oceanic margins in comparatively recent glacial periods. If the valleys descend to 7,000 feet that would seem to indicate that the adjacent lands have been 7,000 feet higher than they are at the present time to give time and conditions for the surface denudation to produce these river valleys. That would raise the Pyrenees region and the whole of the Western Europe to a height a long way above the snow line; and that being so there would be glacial conditions existing over a vast area of the western portion of the European and African continents; and that might be recognised as the cause of the "glacial period." It would seem to be the most important part of the deduction that Professor Hull seems to draw from his examination of the sea bottom of the western coast of our Continent, and it would appear to be the point of greatest interest in this communication.

Mr. HOWARD.—I venture to express the interest which I feel in these investigations, because it is impossible these river valleys should be there without some cause. It is inconceivable that any modern current should cut in that way. It must be either the result of water or ice, more probably, I would venture to suggest, of glaciation, more like the cut of glaciers. That would entirely agree with the idea of an enormous elevation. If the mountains were all that number of thousand feet high it would involve the glacial period; but there has been a very great change of elevation within a comparatively short period of time. The difference of elevation has taken place within a comparatively short period of geological time.

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#### APPENDIX.

Professor Spencer in his essay (No. 11 of the list below) has given a most useful list of papers dealing with the subject of sub-oceanic phenomena on the American side of the globe; and with the object of showing what has been written on the same subject on the European side, the following list, which though not quite complete, will assist in providing investigators interested in the references.

- (1) "Investigations regarding the Submerged Terraces and River Valleys bordering the British Isles," by Professor E. Hull, F.R.S. (with map). *Trans. Victoria Institute*, vol. xxx.
- (2) "Sub-Oceanic Terraces and River-Valleys off the Coast of Western Europe" (with three plates), by the same author. *Ibid.* vol. xxxi.
- (3) "Another possible cause of the Glacial Epoch" (with map), by the same author. *Ibid.* vol. xxxi.
- (4) "The Sub-Oceanic Depression known as 'La Fosse de Cap Breton,'" by Professor Loble. *Ibid.* vol. xxxiii.
- (5) "Deep Sea Soundings in connection with Submarine Telegraphy," by Mr. Edward Stallibrass, F.R.G.S. *Jour. Soc. Teleg. Engineers.*, vol. xvi, p. 479.

In this paper the author describes the Sub-Oceanic channel of the Congo down to the 1,000-fathom contour, giving the length of the channel as 100 miles.

- (6) On the same subject :—"The Sub-Oceanic River-Valleys of the West African Continent, and of the Mediterranean Basin" (with map), by Professor E. Hull, F.R.S. *Ibid.* vol. xxxii.
- (7) "The Physical History of the Norwegian Fjords," by the same author. *Ibid.* vol. xxxiv.
- (8) "Submerged Platform of Western Europe." *Geol. Mag.*, Lond., vol. vi, pp. 16-18 (1899).
- (9) "Professor Hull's 'Sub-Oceanic Terraces and River-Valleys off the coast of Europe.'" A Review. *American Geologist*, vol. xxxv, March (1905). By Professor J. W. Spencer, Ph.D.
- (10) "Dr. Fridtjof Nansen's Researches into the Bathymetrical Features of the North Polar Seas." A Review, by Professor E. Hull, F.R.S. *Geol. Mag.*, Decade V., vol. i, No. 482, 1904.
- (11) Review of the same by Professor J. W. Spencer. *The American Geologist*, vol. xxxv, April, 1905.
- (12) "On the Physiographic Improbability of Land at the North Pole," by Professor J. W. Spencer. *American Journal of Science*, vol. xix, May, 1905.

## ORDINARY MEETING.\*

LIEUT.-COLONEL G. MACKINLAY IN THE CHAIR.

The following address was given by the Author :—

### *THE RESURRECTION OF OUR LORD AND SAVIOUR JESUS CHRIST.* By Rev. Canon GIRDLESTONE, M.A.†

THE subject is one that we shall all have in our minds on Easter Day, and perhaps if we look at it from a historic point of view it may help us when we want our own mind clear on this great fact. In one of the sermons by the celebrated Dr. Arnold, formerly Head Master of Rugby, a sermon called "The sign of the Prophet Jonah," there is a sentence which goes to this effect: "I have been in the habit of studying historical events for many years, and it is my firm conviction that there is no event of history so sure and trustworthy as the resurrection of Christ from the dead." That as coming from a man with a free mind is very strong and very encouraging, and it was one of several things that set me investigating the whole subject a good many years ago. I may say that I date my own personal investigation of it to the year 1860, when I spent Easter in Jerusalem and heard a sermon from the late Mr. Crawford on a text in the 1st chapter of Acts, where we read that Christ showed Himself alive to His followers by many infallible proofs.

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\* Monday, April 17th, 1905.

† Owing to the sudden withdrawal of another paper, this address had to be given at only a few minutes' notice. Hence its lack of completeness: and many aspects of the question were left untouched.—R. B. G.

Now I want to remind you of some of the phenomena connected with the history of this marvellous event. First, what are our materials? We have the four Gospels; the records and the speeches contained in the Acts; certain passages in the Epistles, notably 1 Cor. xv, and some passages of importance in the last book of the Bible, the Apocalypse; and then we have the moral and spiritual side of proof in the deportment of the Apostles and their followers, their courage, their success, and the way in which belief in the crucified and risen Saviour overcame the old religions of Rome and Greece. And of course beyond these there are personal experimental convictions which it is not my business to-day to say anything about. I will not go into the age and authenticity of the books in question, but for the purpose of to-day it is enough to say that I take them as first century productions, and written by Apostles or apostolic men, and therefore to be taken as the highest possible authorities for the fact in question.

Before you can really go into the question of the Resurrection of Christ, it is of vital importance to prove that He actually died. The Mohammedans, as you know, deny that our Lord died, and some people have thought that He was in a state of coma, and that in the coolness of the tomb He recovered. But if He recovered in the coolness of the tomb after all He had gone through, even supposing that the Apostles and the women who loved Him so tenderly had charge of Him, what happened to Him afterwards? and how is it that the Apostles, whose faith in Christ must have been rudely shaken, boldly preached the Gospel of the Resurrection a few days afterwards? You see that a great deal hangs upon the death of Christ; consequently you investigate the materials and see what is said on the subject. You examine the actual words. They are very like one another. St. Matthew and St. Mark, rendered literally, say "He expired"; St. Luke, "He committed His spirit or breath to the Father"; and St. John, "He breathed His last." To expire is to breathe your last. Many of you have stood by a death-bed and watched that last breath, the last sighing out of the soul from the body. The testimony of all the four gospels is that Jesus breathed His last. Pilate was surprised that He had breathed His last so early, but the soldier who had gone to accelerate the death of the other two who were crucified with Him, found that He was dead already. How did they know it? They judged—they were not of course professional men—but they judged from considerable experience. They could tell by what they saw that He was a dead man. But one of the

soldiers, to make certainty doubly certain, with a spear pierced His side, and there came forth blood and water; and you will remember the curious expression of St. John's with regard to it. He might simply have told his story and let it alone; he does not do that. He adds this verse, St. John xix, 35, "And he that saw it bare record, and his record is true: and he" (referring to himself) "knoweth that he saith true, that ye might believe." It is evident from that verse being inserted that he considered it of very great importance that we should know what had been done by the soldier and what the consequence was of the piercing of the heart of Jesus. Dr. Stroud and others in later days have discussed the physical cause of Christ's death, and they agree that He died not of crucifixion but of a broken heart. I must not say anything more about the death of Christ. It is proved as much as anything can be proved.

But now I go to the resurrection. And the first thing that strikes me, on carefully examining the four gospels, is that not one single person saw Christ rise. They saw Him after His resurrection, but no one saw Him rise. I think if any forger had written an account of the Resurrection, witnesses would have been produced who professed to have seen the Lord rise; and I daresay it was often a wonder to the early Christians that no one had seen the Lord rise. When you survey the speeches in the Acts which deal with the subject you find it still the case. They say, We are witness of His resurrection; but they did not see Him rise. They ate and drank with Him after His resurrection, which is very different. What was the meaning of it? We shall see a little later; but what a marvellous fact is this silence of the witnesses of the gospel upon this particular point!

Now we come to St. John's extraordinary testimony which we have in the xxth chapter. There we find Peter and John running a sort of race to see the tomb. John (he perhaps is a little the younger) outran Peter and got first to the tomb. He stooped down—I imagine (though some still doubt) that the tomb was of the nature of a cave—and looked in. He saw the linen clothes in which Christ had been wrapped lying, but did not go in. A natural feeling overcame him, a shrinking from going in; he just looked in. Peter had no such shrinking. He got there very rapidly, and went right in. What did he see? He saw the linen clothes lying and the napkin which had been about the head of the Lord, not lying with them in a sort of heap together, but coiled round in a separate place. "Then went in also that other disciple which came first, and

he saw, and believed." What did he believe? Was it what the women had said, "They have taken away the Lord out of the sepulchre, and we know not where they have laid Him?" No, they did not believe that; for this reason, if people had taken the Lord away they would have taken Him with the wrapping, for it would not have been possible for them to have taken Him out of the wrappings in the sepulchre. There would not have been room. Besides there was a 100 lb. weight of spice, and it would have been all sticking together. Then there was a smaller coil for the face to keep the jaw from falling. The two coils were *in situ*, but the body gone! Peter and John had gone through a good deal of experience, but they had never seen such a thing as that. So that we have two extraordinary facts; first, that no one saw Christ rise, and secondly, that the Lord's burial garments remained empty but *in situ*. That was the phenomenon which these two men saw and which caused them to believe something which they had never taken in before, for as yet they knew not the Scripture of the Old Testament, and so dull were they that they had forgotten what the Lord had promised. So they just went home with this phenomenon on their minds:—"He has gone through some great change; He has vanished from the coil in which His body was wrapped."

Many people must have speculated as to what had happened. One thing was plain; there were the empty wrappings. Consequently the Roman soldiers could not have taken the Lord out of the sepulchre. Their story was a lame one, but it was passed about as an excuse, as there was nothing else to say. Prof. Gardner of Oxford has brought out a book called *Exploratio Evangelica*, in which he says the greatest crux in history is this, "What happened to the body of Christ?" That is a very remarkable confession from a man who is a free handler of the scripture.

Now we have another very remarkable phenomenon; all the four Gospels give instances of the doubts of the Lord's followers. They were in a sceptical frame of mind; they were not prepared straight off to accept the dictum of anybody, and it took that whole day to remove the doubts of some; others still doubted up in Galilee. The Apostle Thomas doubted for a week. He wanted demonstration, and he got it. It is very noteworthy that the four Gospels all candidly tell us of these doubts. All uncertainty, however, vanished before the Day of Pentecost. By that time Christ's followers were all one heart and soul, and they then got the final demonstration.



Then there is yet another phenomenon in the four Gospels. While each of the Evangelists gives two very long chapters, about seventy verses each, to our Lord's crucifixion, and to all the circumstances that led to it, they are uncommonly short in the account of the resurrection. Most of us have puzzled over this. How is it they are not more detailed? I can only suppose details were not thought to be so necessary in the one case as in the other. St. Paul in writing to the Galatians says in the beginning of the third chapter: "O foolish Galatians, who hath bewitched you, that ye should not obey the truth, before whose eyes Jesus Christ hath been evidently set forth—depicted—crucified among you?" It seems to have been the custom of the Apostles to give a most careful account of what happened to Christ in the hours which preceded His crucifixion, but they do not go into the account of the resurrection in the same way. This was partly because no one saw Him rise; and partly because they were recording and not defending. Two, if not three of the Evangelists had seen the risen Lord; and others had seen Him too. That was enough. Most of us probably have wondered at the order in which Christ selected the persons to whom He would appear on that first Easter day, and that His mother should not be named.

We must now revert to a certain phenomenon which has already struck us as extraordinary. In order to find a solution of the facts observed by Peter and John you must go to Paul. Bear in mind that up to that time there had been nothing similar to the resurrection of Christ. Jairus' daughter and Lazarus and the rest simply returned to their old life, and their physical condition was very much the same as it had been before, only, I suppose, they were in very good health. But in the case of Christ it was not a return to the old life. It was an advance to another condition, and the body of Christ was no longer a frame-work animated by the soul, but was now more directly under the spirit. It had been sown an animated body; it was raised a spiritualised body. There had been a great advance and change, perhaps not in the tissue or texture, but still such a change that He was able to appear and disappear in a moment as easily as some little creatures in the water rise up to the surface and go down again in a moment, that change perhaps answering to what we may call materialising and de-materialising, which a spiritual body is capable of for certain reasons. Probably all the appearances of angels in the history of Israel prepared the way for this extraordinary series of events which happened during the great forty days.

In 1 Cor. xv, we have the matter laid bare; now we understand what Peter and John saw. They saw the result of the resurrection, namely, that the body of Christ had been dematerialised and had removed itself from the coil of clothing without disturbing it; the wrappings consequently fell together; nothing more was needed. It used to be said that the clothes had been wrapped up to show that God loves order. I do not quite believe that to be the reason, nor did I understand the reason till I put together 1 Cor. xv, and St. John xx. Peter and John give the facts; Paul gives the solution. The Lord's body became a risen body, and consequently a spiritual body. Let us not think of Christ's resurrection as a recurrence to the old type. Christ is the first-fruits, and it is the new type of humanity which he inaugurated, which we all hope to share if we live with Him now.

There is just this other point: It is often said it is contrary to nature for Christ to have risen. What do we mean by nature? Do we mean only the physical nature, the law of matter? Do we mean plant nature, which introduces new forces? or animal nature, where consciousness steps in? or human nature, which implies moral and intellectual force as well? All these forces are combined in a man. So far nature tells us what *is*, but it may be that God makes provision for what *will be*, and what is preternatural now will be natural hereafter. We always have to take in the element of divine appointment, and the divine aim and purpose has always been not to have such ordinary mortals as we are now, but something of a higher type physically and that dominated by the spiritual. In the resurrection of Christ we come to the realisation of the divine plan, the solution of the divine purpose, or, as it is called by St. Paul, the first-fruits of the divine promise. Christ risen is the earnest of a better type of humanity, which is divine in scale. Man is to be at the top of the scale of creation.

#### DISCUSSION.

The CHAIRMAN.—We are grateful to the Canon for this most interesting and thoughtful address. It is a difficult subject to discuss and there may be a difficulty in discussing it, as we have not had our minds just lately concentrated on this subject. If any

person should like to take part or ask the author to further elucidate any point, it will all add to the interest of our gathering this afternoon.

Mr. ROUSE.—With regard to the main subject I should like to say that the Jews had all power on their side when the number of disciples in Jerusalem was very small and feeble, and therefore it is perfectly certain that if it had been a fraud on the part of the disciples that the Lord had risen from the dead, the Jews would have been able to produce His body or to compel the disciples to do so. Again, not only is there no outside record of their having done so : no record that has come down to us, but no book so far as we know was written by the Jews to dispute the fact of the resurrection. We are indebted to the Bible itself for the idle report which was spread that His disciples came and stole Him away while the guards slept ; and yet the fact that so great a benefactor Who did wonders which the Jews do not deny (though they attribute it to the wrong cause), Who did mighty cures amongst them and Who was a good man (which they do not deny), that they should have put to death this man, and that His disciples should preach all over the Roman world that He was God manifest in the flesh, that He did not linger in the tomb but was risen in a more glorious body, remains as an historical fact. This was a slur upon the nation—that this should go forth to all the world and be told abroad. And yet the Jews of that generation or their children never took the pains to deny that which happened in their own time ; that they never took any pains to write a book on the subject is a thing incredible. Judgment goes by default. Christ must have risen from the dead or we should have had some book in which the Jews denied that fact. Within thirty years of that crucifixion the story of Christ's resurrection, and of the blessings that were to flow from it, covered such a vast number of miles, that some 1,500 or 2,000 miles from Jerusalem, in the city of Rome, multitudes, as we know from the testimony of Tacitus, were submitting to suffer death rather than give up their belief in Christ. What could have convinced them except that they either saw the resurrection with their eyes, or believed the abundant testimony of those who did ?

Professor ORCHARD.—We shall all agree in heartily thanking Canon Girdlestone for his most valuable address. The doctrine of the resurrection is the substantial truth of Christianity ; take that

away and our faith is vain, and we are yet in our sins. It has always seemed to me that the negative argument drawn from the question, What became of the body ? is one which could never be answered by the infidel. The Canon's idea about the clothes—I do not quite agree that the clothes were left exactly as they were worn ; I think I remember the expression that the napkin which was about His head was not lying with the linen clothes but was put in a place apart.\* This seems to show that the Lord rose with deliberation. There was no kind of hurry about the matter. One of the proofs I suppose may be that the Lord appeared at different times of the day to different classes of people, and that He appeared not to one sense, as sight, but to other senses, as hearing, and handling, touch. I cannot think that that was a spectral body which could speak and eat and drink and argue and so forth with the disciples on the way to Emmaus.

We all thank the Canon for his valuable address.

Rev. JOHN TUCKWELL, M.R.A.S.—I should like to join with others in expressing my sense of indebtedness to Canon Girdlestone for this very powerful and admirable address which he has given us. It comes at a time when our thoughts are very much directed towards that great event which has been described as the fundamental fact of our Christian faith. Of course it raises many questions which it is not possible for us to answer ; many questions that await solution.

It does not militate against the reasonableness of our faith in supposing that the body of Christ did rise from the dead. The apostle's language, "It was sown a natural body and raised a spiritual body,"† shows us that there must have been a great and fundamental change which took place. I apprehend we are to understand that from that passage that Christ's resurrection body was the first-fruits of a wide resurrection which is still to take place in the case of all men who have died since humanity existed upon the face of the earth. What our resurrection bodies will be we do not know. There are many speculations upon the subject but most of them are worthless. The only evidence and testimony we have is that of Scripture. Away from that we flounder about in unfamiliar regions.

There is one point which the Canon might have occupied more

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\* John xx, 6, 7.

† 1 Cor. xv, 44.

time in dealing with, and that is the ministry of the Apostles and others of the resurrection of Christ. As you look through the book of Acts you find continually that in the ministry which the Apostles bore to the world, that fact is the fundamental part of their ministry of salvation. Even when the apostle Paul was preaching among the Greeks at Athens he proclaimed Jesus and the resurrection. If there be no resurrection our faith is vain; we are yet in our sins. The resurrection understood in the ministry of the apostles is an actual resurrection. The body was sown a natural body, it was raised a spiritual body. The body in which He had lived and died was raised again from the dead. There were the marks indeed of the nail-prints in feet and hands. He was able to eat and drink with the disciples at their morning meal on the shores of the lake of Tiberias. If you ask how this was done you have no answer. We have to wait for the solution; but that the body was not a mere phantasm is shown. "A body hath not flesh and bones as ye see Me have." It was the body that had been used by Christ in His earthly life and which was taken on by the spirit at His resurrection subsequently.

Then there is another important fact that may serve to establish our faith. Ever since apostolic times and down to the present day no ministry of the Gospel has been of any effect that has omitted the doctrine of the resurrection, and we see it continually going on. We must bear in mind the fact that the pledge of the reality of the resurrection and the reality of the ascension into heaven was that extraordinary phenomenon that took place afterwards in the gift of the Holy Ghost, and we are witnesses of a phenomenon of that nature that cannot be accounted for on any other grounds than these. Perhaps some of you have been in Wales and have seen the things taking place there. What is taking place is inexplicable on any other ground than that the Gospel record is true. If the Gospel record be untrue, then all we can say is that untruth is more blessed and more mighty and more effective upon men's characters than truth. But it is impossible for anyone to believe that error and falsehood can effect these wonderful changes which are taking place in the character and conduct of men.

The Gospel records are essentially records of truth, or these results could not be attained among every class of society, and among all nations wherever it is spoken.

Colonel ALVES.—I would like to ask Canon Girdlestone if outside the Bible there are any allusions in ancient history to the crucifixion of our Lord. There can be no doubt that the disciples went to look for the body of our Lord and that body they did not find, but they found the clothes which He could not have got out of in the sepulchre, that He must have passed through them with a body that was not subject to the limitations that we are subject to. We do not know all the laws of matter.

The risen body of our Lord was not subject to these limitations, but that it was the real body I suppose there can be no doubt. Anybody who reads Scripture honestly cannot dispute the fact that it was a material resurrection of His substantial body.

The SECRETARY.—Before this interesting meeting closes I wish to return thanks to two individuals in the meeting. It is not often we have opportunities of returning thanks to two persons for the part in which they have taken; but we have in the first place to give our very sincere thanks to the venerable gentleman who is now present with us, Dr. Peebles, for his kindness in withdrawing the paper which was down in his name, and which some of you have read, at the request of the Council. I feel sure that it must have been rather a shock when I did my duty in informing him, in the best terms I could command, that the Council wished him to withdraw his paper, which he had taken such pains to write, which is really full of a great deal of fine reasoning and enthusiasm, and which breathes a very strong Christian spirit on the part of the writer. It does not follow, however, that we all agree in everything that an able Christian writer will write.

Having therefore rendered this tribute to Dr. Peebles for the very kind manner in which he fell in with the views of the Council—some men would have protested and given a great deal of trouble and annoyance, but it was not at all what Dr. Peebles has done—the question was who was to fill the gap, and fortunately we had in the Council Room one who is amongst our most leading and learned members, Canon Girdlestone, who very kindly consented, on it being suggested to him, to give an address on the Resurrection of our Lord, a subject most suitable for the season, and for which he was fully prepared when called upon at any time to deliver. It has been one of the clearest expositions on the subject that I have ever listened to or read, and I feel

sure we shall all go away greatly benefited and enlightened on this most wonderful and mysterious and most glorious event, the Resurrection of our Lord, on which our faith depends for the present and for the future.

There is only one point which he, or any speaker, has not alluded to, that is, the Ascension. The Resurrection and the Ascension go hand in hand. Our Lord went into heaven in the presence of His disciples, probably on the Mount of Olives, and they saw Him go up into heaven and a cloud received Him out of their sight. That was the body which rose from the resurrection grave and which is now living in the heavens, where we hope to join Him.

The CHAIRMAN.—Professor Hull has anticipated me in proposing thanks to Canon Girdlestone.

The instances given of the doubts are very valuable. Such are very evident tokens of authenticity, the doubts of the disciples are recorded. These incidental proofs are given and are very valuable. The fact that no one saw the Lord rise, the fact that the doubts of very large numbers of people are recorded, and also the fact that only Christians saw Him at all. These points seem to me valuable and only to be obtained by a little search beneath the surface. We are all most grateful to the Canon, and now I will ask him to reply to those questions which have been asked.

CANON GIRDLESTONE.—A question was asked about the old authors referring to our Lord's crucifixion and resurrection. Of course Tacitus refers to the subject in quite clear words and he mentions Pontius Pilate in connection therewith. It is the crucifixion which is referred to. I do not think the resurrection could have been referred to except by a Christian.

Then came the very obscure question, what became of the real flesh and blood of Jesus Christ. In the first place we have a very interesting testimony of St. Peter, making use of Psalm xvi, "Christ saw no corruption." All Jews believed that corruption set in after the third day. Of Lazarus it is said that on the fourth day symptoms of corruption were beginning to show themselves. Therefore we have to think not of a body lying dead, but of a human frame in good working order so far as all its structure was concerned, only dead through injury to the heart.

We have to consider the case of the body and blood separately. In the case of blood one asks, what is the use of blood? what is the

object of the heart with all the system? Well, the lungs are mainly used to aerate the blood, and the blood is simply to convey the sustentation to the parts. The blood is a carrier, and it carries the small corpuscles which furnish the nutriment of the whole system. In the risen body the system does not seem to need that method of nutriment at all.\* What is the nutriment of the angelic frame? We read in the Psalms that men did eat angels' food. Do angels eat food? How little we know.

It is evident that the Lord was able to reproduce for the benefit of witnesses the very same aspect, the height and colour, and the tone of the voice, which had been known before. He had but to utter one word, "Mary," and she turned round and said, "Rabboni." There was no possibility of doubting that Jesus was the same person she had known before. When the two disciples were going to Emmaus they walked beside Him with burning hearts but did not know Him, but presently, at the breaking of bread, He was revealed. So it was in other instances.

What happened to the Lord's flesh at the Resurrection? I have often watched the process of an acorn's growth. One sees the development of the germ, and the manifestation of little rootlets, and then the parts of the acorn that seemed more important, perish; yet the essence remains in the rootlet and the shoot. But in Christ's case, so far as I can judge, the whole of the material was used up in the resurrection body. It was all turned to account. That body which had been a pure temple of a pure soul, and had never been injured in the way we so often injure our bodies by wrong-doing, that body in its pristine purity at the age of 33, was consigned to the grave, and the whole of the material of the body—apart perhaps from any remaining blood, if there was any, which may be doubted—the whole was turned to account in the resurrection body. It was sown in one condition; it sprang up in another condition. I do not think one is able really to say more on that subject. I notice some one said it was resolved into its elements. I would have liked to hear Professor Lionel Beale on this. He has

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\* It has been suggested to me that sin caused incipient decay, and that much less food would have been needed for the supply of waste tissue if it had not been for the constant antagonism with corruption to which we are subjected at present.—R. B. G.



often told us here of the germ in its original cell parting, parting, parting ; there might be a vestige of an original cell of Adam in every one of us, and it might be there is that *residuum* in the resurrection body that secures its identification with the body that now is. But I dare not speculate on this subject. I will only add that death is abnormal ; Christ is the Prince of Life ; and if any one were to start a new human Race in its perfection and in full life, it would be that Being Who has done so much for the moral and spiritual welfare of the Race as it now is.

## ORDINARY GENERAL MEETING.\*

GENERAL HALLIDAY IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed, and the following paper was read by the Secretary, in the absence of the author.

### *THE INFLUENCE OF PHYSIOLOGICAL DISCOVERY ON THOUGHT.* By EDWARD P. FROST, D.L.

1. The paper suggested by a sense of increasing difficulty of preserving one's religion.
2. No imputation cast upon Science.
3. For fifty years acquirement of miscellaneous information by uneducated multitudes who can read has been on the increase, as also has the popularisation of Science; while Science has made gigantic strides.
4. *e.g.*, Matter has almost been analysed into imponderables so as to bewilder the half-educated as to spirit and matter. Who is to explain that the distinction between phenomenal and spiritual is unaffected by physiological analysis?
5. Geological discoveries and evolution, etc., have modified views on Divine government of universe dangerously.
6. Results of bewilderment.
7. Especially suppression of anthropomorphism.
8. Science enables men to get a better idea of God's infinity and foresight.
9. Difficulties in respect to order and continuity not insuperable.
10. "The Absolute" and "the Unknowable" upset by Science.
11. Toleration results from advance of Science.
12. Union of Religion and Science.
13. Conclusion.

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\* May 1st, 1905.

1. I have been impelled to give utterance to the reflections which form the subject of this paper by the feeling that, as the days of the new century pass, ever-increasing numbers of individuals are finding it more and more difficult to hold fast their religious beliefs and so maintain the life of their souls; while at the same time this serious state of affairs appears to be either unnoticed or ignored by many of those teachers and authorities who might have been providing help and relief.

2. In suggesting that certain elements of evil have attended the recent triumphs of Physical Science, I am not venturing to reproach Science or to blame scientific investigators for consequences which they could not be expected to foresee, to provide against which moreover does not appear to be their business. At any rate it is still more the business of those who are supposed to study moral rather than physical phenomena.

3. During the last fifty years, elementary education has become general, the facilities for the acquirement by the elementarily educated of miscellaneous information have been enormously multiplied, and the popularisation of Science has become prevalent; while through the same period physiological discovery has advanced with ever-quickenening acceleration, until we seem to have arrived within measurable distance of the solution of some of the fundamental problems presented by that branch of Science.

4. For instance, before long *matter* may be analysed, relatively to human limitations, into imponderables, namely, energy, position and quantity; and what then becomes of the natural conception of "A positive antithesis between mind and matter, between the 'spiritual' and the 'material'?" And if it should appear to many an untrained intelligence that the conception of matter which seems to have been entertained is being inverted or shattered, is there not at once a grave menace to their conception of the correlative of "the material"? What is to become of their vague apprehension of the immaterial, of the spiritual? Their "little knowledge," if indeed undigested information deserve the name of knowledge, has become "a dangerous thing," and yet we can neither forbid them to "taste" nor bid them to "drink deep" with any reasonable expectation that they will do so. Who is likely to impress upon them the simple fact that no essential distinction has been affected, or can be affected by any such analysis, and that since matter is as phenomenal and mind as real as ever, "a positive antithesis" between them is still maintained.

5. To take another instance—geologists and those who have developed the theories of evolution and of the adaptability of organisms to variations in environment, have seriously modified earlier notions respecting the physical side or aspect of the Divine government of the universe.

In comparison with the multiplication of general information during the last fifty years, the general information on this subject may be said to have been almost stationary for about a hundred and fifty years before the middle of the last century, while every recent discovery of importance, thanks to the press and to popular lecturers and writers, is made as impressive and "sensational" as possible.

The difference between the logical apprehension of this department of Divine government made possible by modern science, and the imaginative ideas on the same subject which survive the simple beliefs of childhood in men and women of average intelligence, has become so vast as to constitute a grave danger. The revelation of science has seemed to many to cast discredit on the various theological systems of Christendom. Some it has thrown into bewilderment and distress, to others it has furnished excuses for casting off the trammels of religion. It has overstrained intellects of mediocre capacity, causing them to snatch at all manner of faulty and fallacious solutions of their difficulties.

6. This bewilderment has been, and is, I believe, one of the causes (and not one of the least causes) of the alleged prevalence of indifference to religious matters among both the rich and poor, of the "Pagan London" recently discussed in the press, of the increase in insanity, of the prevalence of inordinate curiosity about matters to which one ought to be indifferent, of much dabbling in (so-called) spiritualism, in "occult" mysteries, and in fortune-telling, as well as of avowed atheism and agnosticism.

7. A very important element in the bewildering process has been the impairment or suppression of the faculty of anthropomorphism, of imagining Deity in terms of humanity, a faculty which has for ages been a great help to the maintenance of religious feelings among simple folk. It must, I believe, constitute the religion of all childhood, and is often indulged in subconsciously by adults, who would repudiate any such notion if formally presented to them, very much as we speak of, and subconsciously imagine, the sun going round the earth. It is hardly venturesome to say that if Milton's *Paradise Lost* had not yet been written, it could not now be written by a

Milton brought up to the present standard of thought and feeling.

8. The idea of humanity is capable of enormous expansion, and is generally elastic, but it cannot occupy more than an infinitesimally small fraction of the space suggested by astronomical dimensions.

Professor Seeley wrote (*Nat. Rel.*, p. 20), "The scientific man strains his mind actually to realise God's infinity. As far as the fixed stars he traces Him, 'distance inexpressible by numbers that have name.' Meanwhile to the theologian, infinity and eternity are very much of empty words when applied to the object of his worship."

Similar language might be used with respect to the laws of continuity and uniformity maintained from eternity to eternity, which science has revealed, compared with the theologian's notion of Divine foresight, and "eternal purpose."

9. In the latter case, many see contradiction and incompatibility. I venture to suggest that a basis for the reconciliation between the scientific and the theological positions exists, and is to be found; though it is not so obvious as in the former case. Perhaps it will eventually be admitted by all competent thinkers, that in spite of superficial differences, perhaps due altogether, or in part to the object under consideration being regarded from different points of view, the theological method of explanation conveys the same essential elements of truth as the scientific, and that too in terms better adapted to the comprehension of the unscientific inquirer. But I do not wish, or dare to maintain, that what I may term the mental by-products of physiological progress are all mischievous or dangerous, or that they are confined to persons of only moderate culture and intelligence.

10. The advance of physical science, in all directions, may justly claim credit for the victory of common-sense over "the Absolute" and "the Unknowable." Those Minervas, born in full panoply of polysyllables from the metaphysician's brain without even giving him a headache, are virtually dead or moribund. The Author of the Universe contemplated by science is no abstraction, but is a concrete entity whose attributes are transcendental.

11. The steady growth of a tolerant spirit, and of large-mindedness, among theologians, must be, partly at least, referable to the widening of the mental horizon effected by the excursions of science into the infinitely large and the infinitely small, and also to the direct influence of scientific doctrine on Biblical interpretations. The acceptance of some of the great general-

isations of physiology, with or without reservation, by many prominent theologians, is balanced by the subsidence of the materialistic wave, which some years ago assumed formidable proportions. Elated by success, several eminent physiologists seem to have thought that their methods could bridge the gulf between the phenomenal and the real, or else eliminate the real from the field of thought. Their failure is now acknowledged by leading men of science, and they have by their abortive attempts indirectly contributed something towards the reconciliation or union of Religion and Science.

12. This union I believe to be the solution of the difficulties which now beset religious teachers, and of the perplexities which now tend to promote irreligiousness. It has been said that *such* an union is not possible; but surely, religion ought to aim at a complete theology; and if we believe that God is in all, and all is in God, a complete theology must include the study of the phenomenal as well as the real, including the moral and psychical. Thus a theologian ought to know physiology, while a physiologist only studies the phenomenal. But if the theologian cannot accept the account of phenomena given by physiological authorities, there must be something radically wrong with either theology or physiology, if, as I believe, the latter be that department of theology which deals with the phenomenal aspect of the physical government of the universe by the Deity.

13. We may rest somewhat satisfied if we have some fixed belief, for belief of some kind we must have.\* Life is certainly not worth living without it, and very much worth living with that which to us is truth.†

Professors of Divinity, sincere searchers for truth, and leaders of advanced thought, are compelled to acknowledge that "the field of speculative theology may be regarded as almost exhausted." Dr. Temple declares that "all the countless variety of the universe" was provided for by "one original impress" and not "by special acts of creation modifying what

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\* See 11.

† Even the "theological materialist," Dr. Henry Maudsley, admits that, "It is possible that a frank cognition and vital feeling of the existence of a larger order of things than the human order might help to impart such sincerity of thought, equanimity of feeling, acquiescence in what is, and quiet expectation of what is to be, as shall constitute the bliss of a peaceful mind," *Life in Mind and Conduct*. Though the words quoted did not refer to a spiritual order, they suit it exactly.

God had previously made ; ”\* thus leaving the way clear for us to be in a sense Christian Agnostics as to alleged Divine interposition, though with religion and religious feelings within us to be neither atheists nor materialists, but with a noble consciousness and lofty conceptions of the Great and Universal Spirit of spirits pervading all things, the eternal principle of the universe which we are apt to call the universal laws of nature. At the same time we must not take too much of what we may call the “modern thought” of mankind. Our religion may be positive: it may have its creed, churches, chapels, priests, teachers, rites and ceremonies, morality, aspirations, and consolations, institutions which bring men together to join in services which will take them out of their worldly ideas and show them the spiritual side of their nature, and teach them to form some definite (though very imperfect) conception of the spiritual, some idea of the great Incomprehensible, much to their own benefit and that of succeeding generations.

A short discussion followed, in which Professor ORCHARD and Mr. ROUSE took part, and the meeting separated after a vote of thanks to the author had been passed.

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\* *The Relations between Religion and Science*, Lecture iv, p. 115 (1885).

## ORDINARY GENERAL MEETING.\*

COLONEL T. HOLBEIN HENDLEY, C.I.E., IN THE CHAIR.

The Minutes of the previous meeting having been read and confirmed, the following paper was read by the Secretary, in the absence of the author :—

### *THE MESSIAH OF QĀDIĀN.*

By the Rev. H. D. GRISWOLD, M.A., Ph.D.

#### I. INTRODUCTORY.

ONE of the most interesting characters in India to-day is the Mirza Ghulam Ahmad, chief of the village of Qādiān, in the Gurdaspur District, Panjab. He is the founder of a reforming Mohammedan sect, to which he has given the name *Ahmadiyyah*, or Society of Ahmad. Accordingly his disciples write the adjective *Ahmadī* after their names. But popularly his followers are called *Qādiānīs*, from the name of the village which is the centre and capital of the movement, or *Mirzās*, from the title of their master. The name *Ahmadiyyah* is intended to have a larger reference than simply to the name of the founder of the society. The Prophet of Islām bore two names, *Muhammad* and *Ahmad*. According to the Qādiānī interpretation, Muhammad is the *jalālī* name, and is significant of his triumphant career, while his *jamālī* name is *Ahmad*, which points to the peace and tranquility that he was to spread in the world. *Vide Census of India*, 1901, vol. ix, p. 69. Now the Mirza Ghulam Ahmad denounces the doctrine of *jihād* and with it all crimes of violence committed in the name of

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\* Monday, May 15th, 1905.



religion. He therefore claims that he and his disciples can be fitly described as *Ahmadiyyah*, the society of peace.

The family of Mirza Ghulām Ahmad is of Moghul descent, and came into India from Samarkand, Turkistan, in the reign of Babar, the founder of the Moghul Dynasty. The Mirza Sāhib himself professes to be altogether loyal to the British Government, and he often cites as proof of his loyalty the services rendered to Government by his father and his brother (or rather first cousin, Ghulām Kādar son of Ghulām Muhammad) during the mutiny of 1857, on account of which the latter received honourable mention in Sir Lepel Griffin's book, *The Panjab Chiefs* (vol. ii, pp. 49-50, new ed. by Massy). Another first cousin, by name Mirza Imām-ud-Dīn, attained to some notoriety of another sort. Although he remained a Muhammadan until his death (in 1903), yet he posed as the *guru*, or religious guide of the *chuhras*, or sweeper community, in the Panjab, and advised them not to become either Muhammadans or Christians, but to remain as they are.

Both men, Mirza Ghulām Ahmad and Mirza Imām-ud-Dīn, lived in the same village of Qādiān. Mirza Imām-ud-Dīn claimed to be a kind of successor to Lāl Beg, the traditional religious guide of the sweepers, and to have the mission of teaching them morality, and to this end he prescribed the Ten Commandments, with certain editorial changes (*vide Hidāyat-nāma*, p. 15). But the claims of his cousin, Mirza Ghulām Ahmad are far more pretentious. He professes to have come: (1) in the "spirit and power" of Jesus Christ, and so to be "the promised Messiah"; (2) in the spirit and power of Muhammad, and so to be the promised Ahmad; and (3) in the spirit and power of Krishna, and so to be the promised future Incarnation expected by the Hindus. Thus, in one of his last conspicuous utterances ("The Future of Islam," a lecture delivered at Sialkot November 2nd, 1904; *vide Review of Religions*, November, 1904, p. 410), the Mirza Ghulām Ahmad says: "My advent in this age is not meant for the reformation of the Muhammadans only, but Almighty God has willed to bring about through me a regeneration of three great nations, viz., Hindus, Muhammadans and Christians. As for the last two I am the Promised Messiah, so for the first I have been sent as an Avatar." Thus the claim is made to a universal mission.

In an article entitled "The Early Life and Mission of the Promised Messiah" (*Review of Religions*, February, 1903, pp. 61-67), the Mirza of Qādiān describes the beginning of his prophetic career: "At length the time came when God called away my

father. When my father was yet alive and before any fatal symptoms appeared, the Word of God came to me at mid-day foretelling my father's death after sunset that very day. No sooner had the idea of his death passed into my mind than the inspiration of God broke forth upon me in the following words: 'Is not God sufficient for His servant?' My father died after sunset as the Word of God had spoken. . . . In accordance with this Word which God spoke to me, He took charge of all my affairs, Himself became my teacher, Himself guided my soul in all concerns, Himself supplied me with all I required, and Himself crowned me with honour and glory. I was unknown, God made me famous; I was unrecognised, God gave me glory and renown; I was in want, God granted me affluence. This grand prophecy now shines forth like the meridian sun."

## II. THE DOCTRINE OF MIRZA GHULĀM AHMAD.

The Mirza of Qādiān claims that the promised *Mahdi* and the promised Messiah expected by Muhammadans are not two persons but one, and that he is that person. This is a heretical view, if judged by the standard of Muhammadan orthodoxy. For, as commonly held, the *Mahdi* will be a descendant of Fātima, the daughter of Muhammad and mother of Huscin, and the Messiah will be the Lord Jesus Christ at His second coming. Both the *Mahdi* and the Messiah will be men of blood, who will together fight against the unbelievers until they are overcome. Thus the tradition of orthodox Islām includes the notion of a bloody *Mahdi* who will wage a bloody *jihād* against all unbelievers. Such is the programme which, for example, the Sudanese *Mahdi*, Muhammad Ahmad of Gondola, had in mind and sought to carry out.

Against this popular view the Mirza Qādiānī declares (1) that "the traditions speaking of such a person [as the bloody *Mahdi*] are all of them forged and were perhaps fabricated in the time of the Abbasides" (*Kashf-ul-Ghitā*, 1898, p. 11), (2) that the true *Mahdi* (the Guided One) is to be a man of peace, not a man of blood, and (3) that he, the Mirza of Qādiān, is at once the promised *Mahdi* and the promised Messiah, as it were a "*Mahdi-Messiah*." He says: "The spiritual personality of the Messiah and the Mahdi is a combination of the spiritual personalities of the Holy Prophet Muhammad and of Jesus" (*Review of Religions*, February, 1903, p. 67).

As the Lord Jesus Christ was a man of peace, so he who has come in His spirit and power as the Promised Messiah must also be a man of peace, for he has "inherited the perfection of Jesus Christ." Such is the theory which underlies the Mirza Qādiānī's polemic against the doctrine of a bloody *Mahdi* and the doctrine of *jihād*. As he says: "To believe in me as *the promised Messiah and Mahdi* is to disbelieve in the popular doctrine of *jihād*" (*Memorial to Sir William Mackworth Young*, March 5th, 1898). Thus it would seem that through his claim to be at once the promised *Mahdi* and the promised Messiah the Mirza of Qādiān desires to focus all the Messianic expectations of Islām upon his own person. At the same time "to disbelieve in the popular doctrine of *jihād*" is certainly an excellent thing, provided it be sincere.

But the supreme and central claim of the Mirza of Qādiān is that he is *The Promised Messiah*. As such he signs himself in his numerous writings. His claims to be the promised *Mahdi* of the Muhammadans and the promised *Avotār* of the Hindus are relatively insignificant in comparison with his claim to be the promised Messiah. What does he mean by this claim? He does not mean that he is the very person of Jesus Christ re-incarnated in India, but rather that he has come in the spirit and power of Christ. His conception is this that just as, according to the interpretation of Jesus, John the Baptist was the Elijah which was to come (Matthew xi, 14), because he came "in the spirit and power of Elijah" (Luke i, 17), so he, the Mirza, is the Messiah which is to come, because he is come in the "spirit and power" of Christ. But note the logical consequences of this claim. If the Mirza Qādiānī is the promised Messiah, then (1) his appearance is the fulfilment of all the Bible promises which speak of Christ's Second Coming, (2) no literal coming again of the "same" Jesus of Nazareth is to be expected, and (3) the expectation of a literal Second Coming of Christ on the part of Christians is based on misinterpretation.

As clearing the way for the doctrine of his own Messiahship, the Mirza Qādiānī holds that Jesus Christ did not die on the Cross, but, on the contrary, that He came to India, in order to preach to the descendants of the Ten Lost Tribes in Afghanistan and Kashmīr, and died a natural death in Kashmīr, where his tomb exists unto this day. His grounds for the first conclusion, viz., that Jesus did not die on the cross, are as follows: (1) Certain inferences based upon the Gospel narratives to the effect that Jesus when He was removed from the cross was

not really dead, but only unconscious through loss of blood. He remained on the cross only a few hours and His legs were not broken. Finally, the post-resurrection appearances of Jesus to His disciples were those of the body of a living man and not of a disembodied spirit, since He ate and drank with His disciples and allowed them to touch Him. A revival of the "swoon theory" of the Resurrection. It may be mentioned in passing that through his English educated disciples the Mirza Qādiānī is kept more or less in touch with the sceptical literature on the life of Christ. For example, he is able to refer to the opinions of Professor Schmiedel as found in the *Encyclopedia Biblica*; (2) The *Marham-i-Īsā* or "Ointment of Jesus," is referred to as "the first clue to this all-important discovery." According to the Mirza of Qādiān, "this ointment is spoken of by Jewish, Christian, Parsee and Muhammadan physicians alike, and over a thousand books on medicine contain a description of it" (*Kashf-ul-Ghitā*, p. 25).

In the *Review of Religions*, October, 1903, pp. 394-396, there is a list of thirty-five medical books, mostly Arabic and Persian, which are declared to contain references to the "Ointment of Jesus." The Mirza's theory is that after three days Jesus recovered from the swoon, and that then His disciples applied this wonderful ointment to His wounds with such success that within the space of forty days He was entirely healed and ready for foreign travel. It is unnecessary to say that we have here the "fraud theory" of the Resurrection, the disciples of Jesus being represented as acquainted with the facts and yet solemnly declaring that Jesus rose from the dead. (3) Jesus' interpretation of "the sign of Jonah the prophet" is regarded by the Mirza of Qādiān as a confirmation of the same view. Jesus said: "As Jonah was three days and three nights in the belly of the fish; so shall the Son of man be three days and three nights in the heart of the earth" (Matt. xii, 40). But, says the prophet of Qādiān, Jonah entered the belly of the fish alive; remained there alive, and came out alive. So must Jesus have entered the tomb alive, remained there alive, and came out alive, in order to make the analogy complete. (4) "The Spiritual death of Christianity" (*Review of Religions*, January 1903, p. 40), is alleged in support of the same thesis, namely, that Jesus did not die on the cross, and so did not rise from the dead. He asks: "If Jesus is living, why does not His influence work?" The obvious answer is that Jesus' "influence" does work, as proved among other things by the Revival in Wales.

The Mirza's proofs for the second part of his thesis, namely,

that Jesus, on escaping alive from the cross, came to India and died a natural death in Kashmir, are as follows: (1) The account in Nicolas Notovitch's *Unknown Life of Christ*, to the effect that Jesus visited India. It is needless to say that the *Unknown Life of Christ* is accepted as authentic by no competent scholar. But even granting for the sake of argument its authenticity, it contradicts the conclusion of the Mirza Qādiānī in two important particulars: (a) It makes Christ visit India, not after His crucifixion, but in the interval of sixteen or seventeen years between His visit to Jerusalem at the age of twelve and His public appearance at the age of thirty; and (b) it asserts in unequivocal language the actual death of Jesus Christ on the cross (pp. 133, 195). The view, however, of the Qādiānī *savant* is that the true meaning of the *Ascension* of Jesus was His *separation* from His disciples in order to visit Afghānistān and Kashmīr. But why should Jesus visit these regions rather than any other part of the world? The answer is furnished by the Mirza's theory that the people of Afghānistān and Kashmīr are descendants of the "Ten Lost Tribes." See article on "The Origin of the Afghans and the Kashmiris" (*Review of Religions*, June, 1904, pp. 234-240). The Mirza is apparently not at all disturbed by the fact that in the Ethnographic Appendices to vol. i of the last *Census of India* (1901), the people of Kashmīr are brought under the Indo-Aryan type, and that H. H. Risley, Esq., I.C.S., the author of these appendices, does not deign to notice the theory of the Israelitish origin of the people of Kashmīr. (2) As furnishing a kind of *a priori* proof that Jesus would naturally go in search of the Ten Lost Tribes, the Mirza Ghulām Ahmad cites the following words of Jesus: "The Son of Man came to seek and to save that which was *lost*" (Luke xix, 10); "I was not sent but unto the lost sheep of the house of Israel" (Matt. xv, 24); "And other sheep I have which are not of this fold . . . they shall hear My voice" (John x, 16). *Vide* the article "Jesus among the Ten Lost Tribes in the East," *Review of Religions*, January, 1903, p. 8. Thus it is proved to the satisfaction of the Qādiānī seer that it was necessary in the nature of things that Jesus should visit India; (3) A further confirmation is given by the verse *Qurān* (xxiii, 52): "And we appointed the Son of Mary, and his mother, for a sign: and we prepared an abode for them in an elevated part of the earth, being a place of quiet and security, and watered with running springs" (Sale's trans.). On this it is remarked, "This description does not apply to any land so well as it

applies to Cashmere, especially when we bear in mind that there is no other country which is so like His native land Galilee, in the greenness of its soil, and the charming beauty of its scenes. Moreover, the verse plainly indicates that the refuge was given after some heavy misfortunes, or great danger, for the word *āwā* signifies the giving of refuge in danger" (*Review of Religions*, June, 1903, p. 225). (4) But the crowning proof that Jesus visited Kashmīr is found in the existence of a tomb in Srinagar, Kashmīr, which the Qādiānī people with one accord stoutly affirm to be the very tomb of Jesus Christ. It is the tomb of a certain *Yus Asaf*, and is situated in Khān Yār Street, Srinagar. It is asserted that the keepers of this tomb regard it as a tomb of a *Prince-Prophet*. But Muhammad was the last of the Prophets. Therefore it must have been before his time. Whose tomb could it be but that of Jesus? Besides, the first part of the name *Yus Asaf* is clearly a corruption of *Yasu* (!) or Jesus, and *Asaf* (from Hebrew *āsaf*, to gather) means gatherer. Hence, according to the Qādiānī interpretation, *Yus Asaf* means Jesus the Gatherer of the lost sheep (*i.e.*, the ten lost tribes) of the House of Israel.

Thus, according to the revised life of Jesus as described by the Qādiānī school, Jesus Christ by opportunely becoming unconscious escaped the fate which befel His comrades in crucifixion, and through the wonderful efficacy of the "Ointment of Jesus," was soon healed and ready for His journey to the East in search of the "lost sheep of the House of Israel." He preached to His brethren in Afghānistān and Kashmīr, and finally died a natural death at the age of 120 years and was buried in Srinagar. The writer of this paper visited the tomb of *Yus Asaf* in Srinagar, Kashmīr, on September 5th, 1903. While there, he was informed by the keepers of the tomb that *Yus Asaf* was by tradition a very tall man, being no less than 40 yards long. Now 40 yards equal 120 feet, and 120 feet might possibly be interpreted as 120 years. Such seems to be the origin of the 120 years.

This theory of the death of Jesus Christ is given great emphasis, because in the view of the Qādiānī aspirant to Messiahship it is absolutely fundamental to his claim to be the promised Messiah. If the Christian belief that Jesus Christ died on the cross, rose again on the third day, and ascended into heaven, be true, then the predicted second coming of Jesus Christ will be the second coming of "this same Jesus" (Acts i, 11), and not of one who comes merely in His "spirit and power." Hence the Qādiānī Mirza tries to break down

the Christian belief that Jesus passed by the way of death and resurrection into the glory of His Father, and also the Muhammadan belief that Jesus without death was "taken up" to God. His conclusion is that "Christ died like ordinary mortals" (*Kashf-ul-Ghita*, p. 13), and the consequences which he would draw from this conclusion are as follows: (1) negatively, (a) the overthrow of the doctrine of Christ's sacrificial death, resurrection, ascension and second coming, as accepted by Christians, and (b) the overthrow of the belief that Christ was "taken up" to God and will come again to the help of the *Mahdi* as accepted by Muhammadans; and (2) positively, the leaving of the way open for the coming of one who will come in "the spirit and power" of Christ, yea, who has already come in the person of the Moghul Messiah, Ghulām Ahmad, of Qādiān.

Thus the negative work has been done and the ground has been cleared for the *constructive* part of the Qādiānī proof. It is unnecessary to elaborate the positive side of the argument in detail. A few hints will suffice. It is chiefly along the line of parallelism or correspondence that the constructive argument is developed.

(1) Correspondence between the First Adam and the Second Adam. At the close of the sixth day, God created the first Adam. But one day is with the Lord as a thousand years. Therefore at the close of the sixth millennium or the beginning of the seventh, the second Adam is to appear. But we are now at the beginning of the seventh millennium, if we reckon according to the lunar year, which is the inspired mode of reckoning; and so the time is fulfilled for the second Adam to be manifested. Where is the second Adam to appear? "In the east and not in the west," says the Mirza Ghulām Ahmad, "for from Gen. ii, 8, we learn that God had put the first Adam in a garden *eastward*. It is therefore necessary that the second Adam should appear in the *east*, in order to have a resemblance with the first in respect of his locality" (*Review of Religions*, January, 1902, p. 15). Hence the Mirza Ghulām Ahmad is demonstrated to be not only the Messiah of Islām but also *the Second Adam*. In the Mirza's Sialkot address (*Review of Religions*, November, 1904, p. 397) the parallelism is still further elaborated: "In being last of all he (*i.e.*, Mirza Ghulām Ahmad) has a resemblance with Adam who was the first of all. . . . Moreover, Adam was born on Friday and along with him was born a woman. So it happened in my case, viz., I too was born on Friday and was born a twin, a girl being born

before me. This mode of birth indicated that I was the last of the *Imāms*."

(2) Correspondence between the Children of Israel and the Children of Ishmael. These two tribes are of fundamental importance in divine revelation. The great prophets of the former were Moses and Christ. Christ was the final prophet of the Jews, the last brick in their national and religious structure. Their rejection of Christ involved their own rejection and the loss of their nationality. Then came the turn of the Children of Ishmael. According to Deut. xviii, 18, a prophet was raised "like unto" Moses from among the "brethren" of the Israelites in the person of the great law-giver, Muhammad (*Review of Religions*, May, 1902, p. 206). Muhammad therefore was the Ishmaelitish prophet, as it were *the Moses of Islām*. But Moses and Christ were separated by an interval of twelve or fourteen centuries. Hence, in order to preserve the parallelism, another prophet must rise twelve or fourteen centuries after Muhammad, who will be, as it were, *the Christ of Islām*. Who can this be but Ghulām Ahmad of Qādiān? The relation between these great prophets may be set forth in the form of a proportion. Thus, as Moses is to Christ, so Muhammad is to Ghulām Ahmad; or again, as Muhammad is to Moses, so the Mirza Sāhib is to Jesus Christ. In a word, as Moses is a type of Muhammad, so Jesus of Nazareth is a type of Ahmad of Qādiān.

(3) Correspondence between Jesus of Nazareth and Ahmad of Qādiān. (a) As regards the times marked by the advent of each. Both advents are followed by a millennium—the advent of Jesus of Nazareth by the negative millennium of the devil's imprisonment (*cf.* Rev. xx), and the advent of Ahmad of Qādiān by the positive millennium of the kingdom of God. (b) As regards political circumstances. This is summed up in the statement that just as the Jewish Messiah appeared in Palestine when it was subject to the Roman Government, so the Moghul Messiah has appeared in India while it is subject to the British Government. (c) As regards descent. "Jesus was not fully of Israelite descent, but He was called an Israelite only because His mother was of that race. Similar is my case. Some of my grandmothers too were *Sayyids*, though none of my ancestors was himself a *Sayyid*. The birth of a child who did not partake of the blood of an Israelite father indicated that Israel had forfeited half its claim to Divine favour, and would forfeit the other half on further transgressions, and that the next prophet would be from a



totally different nation. As this world is now coming to an end, therefore in my descent from a tribe other than the *Quresh*, there is an indication that the end of the world would cut off all claims of the *Quresh* to *khilāfat*" (*Review of Religions*, November, 1904, p. 400). (d) As regards moral and religious conditions. The Mirza Sāhib draws a rather impressive parallel between the moral and religious needs, which nineteen hundred years ago required the presence of Jesus Christ, and the same needs to-day both in Islām and in Christianity, which, with equal insistence, according to the Mirza Sāhib, call for the promised Messiah. Morally, the times are out of joint, "Society is rotten to its very core" (*Review of Religions*, p. 60). The special sins of Christendom are drunkenness, prostitution and gambling; and those of Islām are the *ghāzi* spirit, immorality, lack of love, etc. Such evils "call for a reformer." The Mirza Sahib's principle is that *Necessity itself is proof* (*Zarūrat-ul-Imām*, p. 25), i.e., since the true reformer has appeared at Qādiān, the very necessity which called for him may be cited as proof of the reality of his claims. Religiously, the condition of things is no better. The fear of God has vanished from before the eyes of men. Islam is cursed with the doctrines of *jihād*, a bloody *Mahdi*, and tomb-worship, and besides there is no unity of belief on such important doctrines as the death of Christ and His second coming (*vide Zarūrat-ul-Imām*, pp. 24, 25). And as regards Christianity, it is cursed with false doctrines such as the deification of Jesus Christ and belief in His atoning death.

Of the Jews in the time of Christ, the Pharisees believed too much, the Sadducees too little, and the whole religious life of the time was marked by formalism in worship and unrighteousness of life. So is it to-day in Islām. Muhammadans of the old school, who are under the guidance of the ignorant Mullahs, outstrip Roman Catholics and Buddhists in their reverence for saints and devotion to tomb-worship. In short, they are superstitious and believe too much. On the other hand, Muhammadans of the new school, e.g., the followers of Sir Sayad Ahmad, hold very loose views on the subject of revelation and resurrection. They are rationalistic and believe too little. A divinely appointed *Umpire* is necessary in order to arbitrate between these various positions and to restore "the golden mean." Such is the mission which the Mirza Sāhib claims for himself. He is the *Hakam* or umpire in religious matters for the present age; (e) As regards mission. The Mirza

Qādiānī claims to be, like Jesus Christ, a divinely appointed *Mediator* between God and man, and so a true *Intercessor* with God for man. To sum up, the Mirza Sāhib claims to be the spiritual leader of his time, the mediator between God and man, the promised *Mahdi* or spiritual warrior of God, the *Hakam* or divinely-sent arbitrator, the second Adam, the true *Ahmad* or spiritual manifestation of the prophet Muhammad, the promised Messiah, and metaphorically a manifestation of Deity; (f) As regards credentials. Ahmad of Qādiān claims to be like Jesus of Nazareth, as regards the "signs" which have accompanied his mission. These signs are both natural and supernatural and consist of miracles, fulfilled predictions, answers to prayer, eloquence in the Arabic tongue, profound understanding of the Qurān, growth in the number of disciples, good effect of the doctrine on the lives of disciples, etc.

Such then are the proofs, both negative and positive, by which Ahmad of Qādiān seeks to demonstrate his claim to be the promised Messiah. As by claiming to be the promised *Mahdi*, Mirza Ghulam Ahmad seeks to focus the Messianic expectations of the Muhammadans upon himself, and as by claiming to be the promised *Avatār* he seeks to fix the Messianic hope of the Hindus upon himself, so by claiming to be the promised Messiah he clearly hopes to turn all the Messianic expectancy of Christians towards himself. As *The Review of Religions* puts it: "The appearance of a single person, in fulfilment of the expectations of three different nations, is a happy sign of the union of the three great nations of the world, the Hindus, the Muhammadans, and the Christians." (November, 1904, p. 427.)

Thus, the programme is universalistic, and the aspiration is toward religious sovereignty over the nations. The Roman empire has ceased to be, nevertheless it still exists in the form of the Roman Church; for is not the Pope of Rome (jealously selected as a rule from Italy) the spiritual ruler of a vast multitude over all the earth? In like manner the Moghul empire has ceased to be, and yet there seems to be in the mind of the Moghul chief of Qādiān the dream of a Moghul church with himself as the head, and wielding spiritual sovereignty over all mankind.

### III. THE AHMADIYYAH SOCIETY.

According to the census of 1901, there were reported for the Punjab, "1,113 followers, males over 15, of Mirza Ghulām

Ahmad of Qādiān" (vol. xvii, p. 143); for the N.W. Provinces and Oudh, "nine hundred and thirty-one persons returned their sect as *Ahmadiyyah*" (vol. xvi, p. 96); and for the Bombay Presidency the members of the *Ahmadiyyah* sect of Musalmans "appear to number over 10,000 persons" (vol. ix, p. 69). It is quite likely, judging from the returns in the Bombay Presidency, that in the Punjab and N.W. Provinces many followers of the Mirza Qādiānī were entered simply as Muhammadans and not as members of the *Ahmadiyyah*. The Mirza Ghulām Ahmad claims himself to have at the present time "more than 200,000 followers" (*Review of Religions*, September, 1904, p. 345). This is probably a great exaggeration. Nevertheless, it is pretty clear that the Mirza Qādiānī has some tens of thousands of followers in all India. So far as is known to the writer of this paper, the Mirza's following comes entirely from the ranks of Islām. It is a disintegrating movement within the bounds of Muhammadan orthodoxy.

As regards methods of propagation the Society is marked by great aggressiveness. The press is fully used, and a constant stream of books, pamphlets, handbills, etc., pour forth from the Society's publishing house at Qādiān. Many of the pamphlets and handbills in English are sent to the leading newspapers all over the world. It is intended that the village of Qādiān should also be the educational centre of the movement. The Mirza Sāhib's High School at Qādiān has already blossomed out into a secondary college, teaching up to the first arts. It is worthy of note that the only students in the Panjab who have taken Hebrew for a university examination have come from Qādiān. This year two appeared in Hebrew for the entrance examination and one for the intermediate.

The vigour and enthusiasm with which the Messiah of Qādiān, in season and out of season, publishes his own name and sounds forth his own praises, puts us to shame whose holy mission it is to make known the name of Jesus Christ, the true Messiah and Saviour of the world. And finally, the Mirza Qādiānī's own impressive diagnosis of the moral and spiritual evils of the day, both in Islām and in Christianity, ought to help to constrain us, not indeed to give thanks that the promised deliverer has already come and is in our midst, but rather to lift our eyes with longing and prayer to God that soon, whether through a personal appearing in glory to rule the earth in righteousness, or through a widespread and powerful outpouring of His Spirit, the Christ of God may come.

## IV. LITERATURE ON THE AHMADIYYAH SECT.

1. *Census of India*, 1901, vol. ix, p. 69, vol. xvi, pp. 96-97, and vol. xvii, p. 143.
2. *The Review of Religions*, a monthly journal published at Qādiān. It was started in January, 1902, and is the English organ of the Society.
3. *Mirza Ghulam Ahmad, the Mehdi-Messiah of Qādiān*, by H. D. Griswold, Lodiana, Mission Press, 1902, pp. 1-32. A statement and criticism of the claims of Ahmad of Qādiān.
4. *The Greatest Discovery Exploded, or the Death, Resurrection, and Second Coming of Christ established against the Aspersions and Claims of Mirza Ghulam Ahmad of Qādiān*, by Rev. G. L. Thakur Dās, Lodiana, Mission Press, 1903, pp. 1-24.
5. *Moslem Teaching as to the Sinlessness of Muhammad, being an Exposure of the Frctitious Theory of Mirza Ghulam Ahmad, of Qādiān, on the Koranic meaning of zamb and jurm*, by James Monro, Esq., C.B., Calcutta, Baptist Mission Press, pp. 1-51. A reprint of correspondence which originally appeared in the *Epiphany*, together with a running commentary to explain the course of the correspondence.
6. *Ibtāl i Mirza, or the Refutation of Mirza-e-Qādiānī*. A reprint of articles which originally appeared in the *Taragqi*, a monthly Urdu magazine published by the Punjab Religious Book Society, Lahore, 1903, pp. 1-154. The ablest criticism of the pretensions of the Mirza of Qādiān which has yet appeared.
7. Many articles in criticism of the doctrines of Mirza Ghulam Ahmad have appeared in the issues of the *Nūr Afshān*, an Urdu weekly paper published at Ludhiana.

## DISCUSSION.

Colonel ALVES.—I think that when we entered this room most of us did not know who Qādiān was or where it or he was.

This of course is one of the signs of the time. We are to expect that false prophets and Christs should arise, and if it were

possible deceive the elect. Now it seems to me an astonishing thing that nearly all of our Missionary Societies, individually and collectively, and so very few people seem to have realised the truth of the first promise, given of course in threat or warning to the Serpent, "it shall bruise thy head."

I think that one reason, humanly speaking, why so many false prophets will arise and get a great following is this, that the true Christ and the true doings of that Christ when He comes again in glory, are not proclaimed as a preliminary to the preaching of the Gospel by our Missionary Societies. How many are dead in their iniquities. It is a most important truth which should be proclaimed to those who are looking for somebody. It is the first duty to proclaim that person and so get in touch with them. If you proclaim a coming King you are in touch with Mohammedans and Hindus. Before you can bring them into touch with other points you must bring them into touch with something which has been handed down—a truth which they have never truly lost, however much it has been corrupted.

Mr. ROUSE.—In Mr. Griswold's paper we have a quotation from Nicholas Notovitch's *Unknown Life of Christ*. I daresay that some of us remember, I think it was about ten years ago, a remarkable statement in the newspapers that this traveller had discovered in a Buddhist monastery in the far north of India—on the borders of Tibet or in Tibet itself—a remarkable life of Issa, that is, Jesus, in which it was stated, as here mentioned, that He spent a great part of His boyhood and youth in travelling to and about that region. That statement however was at once disputed by the Moravian missionaries, who have the credit of first carrying the Gospel into this region; for they declared that, after careful inquiries at the monastery they could find no record of Notovitch having visited it at all. But anyhow, even if he had, his statement, as we here see, does not at all harmonize with that of the so-called Mirza; because the visit was paid, if it be true, by Jesus when He was a boy or youth, and not after He was supposed to have risen from the dead, as the Messiah of Qadian says.

Again, we read here that, according to him, the words, "I was not sent but unto the lost sheep of the house of Israel," and "The Son of Man came to seek and to save that which was lost," refer to the Ten Tribes. This they certainly mainly do not; because the

Lord Jesus addressed the first words to a Canaanite woman to apparently deprecate His working a miracle on her behalf because she did not belong to the people of Israel *at large, amongst whom the two tribes were included* (she having asked Him, because He had done many miracles in *their* midst, to extend His favours); and, when He used the second words, He was referring to the repentance and salvation of Zacchæus, who we may safely conclude belonged to the Two Tribes, since his home was at Jericho, in Judæa.

Again, whereas there are strong reasons, endorsed by the learned, for believing that the Afghans are Israelites, there is no proof that the inhabitants of Cashmere are such.

As to the arising of such Messiahs, we have lately had the Mahdi in Dongola and at Khartoum; we have this man here spoken of; we have had a Messiah appearing in the western United States, and men getting leave from railway companies in order to follow him to be cured of their injuries sustained on the railways. The last man, after flourishing for a few weeks, disappeared, saying blasphemously that the Father needed him elsewhere. And now we have a remarkable man who has preached for many years to a certain small sect in London, claiming to be the Messiah: I speak of the leader of the Agapemonites. But this is just what our Lord Jesus Christ foretold, that shortly before His final coming one of the signs would be that many would arise in His name saying "I am Christ." Then what guidance did He give as to such startling announcements? "If they shall say unto you, Behold He is in the desert" (like the Mahdi), "go not forth; Behold, He is in the secret chambers" (like the man in the Agapemonite Retreat), "believe it not: for, as the lightning cometh out of the East and shineth even unto the West, so shall also the coming of the Son of Man be:" that is to say, when the Lord Jesus Christ returns, as we have just heard, He will return in mighty power, and be visible to all mankind. In Zech. xiv, and in other places, though less clearly, both in the Old Testament and in the New, it is said that the foe whom we describe as the anti-Christ will gather an army drawn from many nations, and lead it against Jerusalem, and that at first he will be victorious, but ultimately God will descend and "His feet shall stand upon the Mount of Olives," and from there He will pass on to victory and destroy that vast army and then establish His reign of justice and peace over all the earth. It is remarkable that

just as in Zech. xiv, 4, it says that the Lord's feet shall stand upon the Mount of Olives; so, when the eleven disciples with their companions were looking up into heaven after the ascending Jesus, two angels appeared to them and said: "Ye men of Galilee, why stand ye gazing up into heaven? this same Jesus, which is taken up from you into heaven, shall *so come in like manner* as ye have seen him go into heaven," Acts i, 11—that is to say, comparing it with Zechariah, that He shall descend in glory upon the Mount of Olives.

The CHAIRMAN.—The paper is extremely interesting from many points of view, and not only from the personality of the Mirza, who claims to be the Messiah, but from the fact that his is one of the very latest of the many sects of Mohamedans and Hindus. New sects are very common in India in both religions. A large book has been written, I think, by a missionary at Ludhiana on the sects of Hindus alone. Some of them are of a very obscure and even degrading character; but, in the majority, there is a general tendency to cope with the special evils of the times and to start reform. The Sikh religion was a powerful effort of the kind. Also in Bengal was the extensive body which followed Chatanya, whose teaching had many good points. In Rajputana many small sects have arisen, such as the Dadu Panthis, the Ramsnehis and others. In most of them there was a groping after the truth. In the lifetime of the founder they flourished, but decay as a rule soon set in after his death. So in the ordinary course we may expect that, on the death of Mirza Ghulam Ahmad his cult will probably decline. He writes on quite familiar lines such, for example, when he makes much of the similarity and significance of words. Thus Mohamad has a *jalali* name, that is a glorious one, and therefore, he had a triumphant career, but he had also a second or *jamāli*, that is beautiful name, viz., Ahmad (praiseworthy), which the new Messiah interprets as pointing to peace, and therefore which must apply to himself as that is his own name. His brother was also a religious leader for the sweeper community, hence he too must be a guide.

The usual thing is that when a prophet dies his memory is revered by worship of his foot-print, which is carved in stone, if he be not in Hindu sects converted into a god or a minor incarnation or an atom of one, and so the cult maintains some degree of permanency.

The speaker mentioned the ten lost Jewish tribes. I remember how, at the Royal Asiatic Society, the late Surgeon-General Bellew contended that not only were the Jews moved from one country to another, but that other tribes were forcibly migrated by Alexander the Great from Asia Minor to the Punjab, and strove to prove his views by the similarities which he saw between the Punjabi and Greek tongue. Other writers have also given in that way a Semitic or Central Asian origin for some of the inhabitants of the Punjab and Rajputana. It is probable that the prevailing ideas of both Europeans and natives therefore guided the Mirza in his speculations on this question.

As regards the remarks on the grave of Yus Asaf in Srinagar, there is great respect everywhere for such tombs. Several years ago I occupied rooms in the palace of the Hindu Maharajah of Bardwan, and just outside our window we saw the grave of a Mahomedan pir or saint, which was not only tolerated but visited, and offerings placed upon it by Hindus as well as Musalmans in order to propitiate the occupant. On the road to Baalbek, a little later, we were shown the tomb of Noah, which was 120 feet long but only two or three feet wide. It was covered with pocket handkerchiefs, which women placed there in the hope of getting children or of saving their sick ones. Some people said it was part of an old water pipe! The tomb of Abel was not far off, and I believe there is another of his near Mecca; but all these old monuments have one thing in common in that they refer to the antediluvian patriarchs and were very large. In later ages the length diminished; but as our Lord's stature was that of an ordinary man, the Srinagar tomb could not have been his. Indian Mohamedans would readily understand such an argument; but the truth is the Mirza is a very clever man who makes the most of a little knowledge. His astuteness is shown also in making use of current beliefs and of all the religions of which he knows anything. All people in the East are at present on the look out for some great prophet—Messiah—or Mahdi. The Hindus expect the tenth incarnation of Vishnu or the Kalki Avatāra, and even say where he is to appear—viz., at Sambal in the central provinces of India. He will be seated on a horse of which three legs are on the ground and the fourth is raised. When the beast puts the uplifted foot on the ground the incarnation will appear and conquer and rule the world.



The Mohamedan Mahdi must be born in the family of Husain, and be a descendant of Fatima the daughter of the prophet. A common belief in North India is also that as a child he will have milk in his veins. The new Messiah gets over the difficulty of not being of the lineage of Mohammed, but I should like to ask whether milk instead of blood circulates in his body? It is believed by the vulgar that the British vaccinate in order to discover the new Mahdi, so that like Herod of old they may slay the innocent. The extensive bibliography on the last page of the paper shows that the sect is attracting a good deal of attention, but, at the same time, that it was being adequately dealt with, and its fallacies, absurdities and feeble arguments exposed, especially from the Christian point of view—this was being done with special ability in the *Epiphany*, the able publication of the Oxford Mission in Calcutta, which is now so much appreciated by thoughtful Europeans and natives in India.

Mr. J. O. CORRIE, B.A.—The *successful* insistence by Ghulam Ahmad of Qadian on the peaceful character of his Messiahship, as opposed to the popular Mohamedan doctrine of a bloody Mahdi, who will wage a bloody *jihad* or war against unbelievers, is an evidence of the infiltration that goes on of Christian ideas into Indian religious notions:—other evidences are the Brahmo Somaj and the Arya Somaj (*vide C.M.S. Intelligencer*, Feb. 1905, pp. 93, 94; and May, 1905, p. 335).

The phenomena of false Messiahs, and spiritual leaders, such as Brigham Young, Dowie and others obtaining considerable numbers of followers point to a longing in humanity for a spiritual leader. (Perhaps the Papacy is another case in point.) It is forcibly argued that the yearning for immortality, so general in mankind, is an evidence that man is immortal; for, otherwise, God would not have given it. Does not a like consideration apply to this widespread desire for a spiritual leader? May it not be an indication, that One will come, who will satisfy that longing? namely, our Lord Jesus Christ.

Colonel HENDLEY then moved that the cordial thanks of the meeting be conveyed to the author of the paper for his valuable communication.

## ORDINARY MEETING.\*

MARTIN L. ROUSE, Esq., B.L., IN THE CHAIR.

The Minutes of the previous meeting having been read and confirmed, the Secretary (in the absence of the author) read the following paper :—

*THE MINERALS AND METALS MENTIONED IN THE OLD TESTAMENT. Their paramount influence on the Social and Religious History of the Nations of Antiquity.*  
By Chev. W. P. JERVIS, F.G.S., Member of the Italian Geological Society, Rome; late Conservator of the Royal Italian Industrial Museum, Turin.

### PRECIOUS STONES, ISRAELITISH TIMES.

B.C. *circum* 1520. The first allusion we know of to precious stones as already sought for in those ancient times is that of Job. "As for the earth out of it cometh bread, and under it is turned up as it were fire; the stones of it are the place of *sapphires* (lapis lazuli, see below, p. 262, etc.), and it hath dust of *gold*." (Job xxviii, 6.)

B.C. 1491. Although Moses simply records that the children of Israel on their departure from Egypt spoiled the people, or land, of jewels of gold and jewels of silver, the sequel proves that many of these must have formed the settings of precious stones, of very great value, since in the wilderness the free-will offerings of the host included the twelve precious stones for the breastplate of the ephod.

Though numerous specialists have devoted the most conscientious study to the precise signification of the Hebrew

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\* Monday, May 22nd, 1905.

text of the Bible as to what stones were employed, no one has ever been able to identify unquestionably more than a few of them. The rest have been doubtfully attributed to several mineral species, mineralogy being so recent a science; and it is reasonable to assume that the word of the Hebrew scriptures for such stones was but that by which they were known to the Egyptians. Can they therefore be ever interpreted by us? One only solution seems to present itself as logical, which is to take the earlier understood and more recent Greek text descriptive of the heavenly Jerusalem; for, be it remembered, that all the Mosaic ceremonies were essentially typical. In the priestly breastplate the names of the 12 tribes of Israel were severally engraved, while the wall of the City had 12 foundations, and in them the names of the 12 Apostles of the Lamb. Now let us give the parallel texts in the Old and New Testament, and compare them together, holding that the stones were identical in either case. Should such an explanation be accepted a slight advance would be possible.

B.C. 1491.—“Thou shalt make the breastplate of judgment with cunning work; after the work of the ephod thou shalt make it, of gold, of blue, and of purple, and scarlet, and of fine twined linen shalt thou make it. Four square shall it be being doubled. And thou shalt set in it settings of stones, even four rows of stones. The first row shall be a *sardius*, a *topaz*, and a *carbuncle*; and the second row shall be an *emerald*, a *sapphire*, and a *diamond*; and the third row a *ligure*, an *agate*, and an *amethyst*; and the fourth row a *beryl*, and an *onyx*, and a *jasper*. And the stones shall be with the names of the children of Israel, 12 according to their names, like the engravings of a signet, every one with his name shall they be, according to the 12 tribes . . . And Aaron shall bear the names of the children of Israel in the breastplate of judgment upon his heart” (Ex. xxviii, 15-29). It may here be observed that the order in which these stones are given in the Septuagint Greek translation differs greatly from the original Hebrew.

In the apostle John's vision of the new Jerusalem “the building of the wall of it was of *jasper*, and the foundations of the wall of the city were garnished with all manner of *precious stones*. The first foundation was *jasper*, the second *sapphire*, the third a *chalcedony*, the fourth an *emerald*, the fifth a *sardonyx*, the sixth *sardius*, the seventh *chrysolite*, the eighth *beryl*, the ninth a *topaz*, the tenth a *chrysoprasus*, the eleventh a *jacinth*, the twelfth an *amethyst*.” (Rev. xxi, 18-20.)

*Udem*, translated *sardius*, *σάρδιον* in S.; *σάρδιος* in R., is *serd*

in Persian; *sardum* in Syriac; *sardinon* in Coptic; *samuk* in Samaritan. It is given as *sardius* by B. K. L. R. S.\*

Sardius, or noble carnelian pits exist in Guzerat near the river Nurbudda, thirteen miles from Baroda, and have been worked from the remotest antiquity. Other pits whence sardius is obtained in the same region are worked near Ratanpur and Kompurwanye. The Indian sardius, which is derived from igneous rocks, differs from carnelian only in its being coloured milk-white, greenish, or black. The natives heat it powerfully for a few hours in pots with goat or cow dung, when the dark orange varieties assume a splendid clear, uniform red colour, becoming somewhat translucent. It is a very precious stone, and was worked by the ancients in a most magnificent manner. Udem is supposed to have been a variety, from Odom, red. These pits are exclusively worked by the primitive indigenous races, who send all the produce to be cut by the celebrated lapidaries at Cambay. Noble red sardius is likewise found in Bokhara.

*Shebo*, translated agate, *ἀχάτης* in S., is achates in Coptic, whence *achates* in Latin; *shebo* in Persian; *sebog* in Arabic. Given as agate by B. K. L. O. It evidently corresponds to chalcedony, *χαλκηδών* in R.; both are mineralogically identical, only the latter being uniformly whitish, and the former polychrome.

*Shoham*, translated onyx, *όνύχιον* in S., by others *όνυξ*, *σαρδονικον* and *βερύλλιον*; sardonix in Latin, is given as onyx by B. L. S. J., and clearly corresponds to sardonix, *σαρδόνυξ*, in R. J.; it is stated by K. to signify beryl, but there does not seem to be sufficient ground for his interpretation, the more so as he also suggests sardonix as probable. Sardonix differs from carnelian simply from its yellow colour. It is found in India with the sardius, also in Egypt.

*Yahalom*, translated diamond; (?) the *χρυσόλιθος* of the S., given also as diamond by B. and L., is considered by K. to have been the *όνύχιον* of the S.; whence he translates it onyx. In fact the so-called greenish diamond from near Baroda is merely a variety of chalcedony, and if so would correspond to *χρυσόπρασος* in R., that being simply a greenish variety of

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\* Abbreviations.—Authorities. B. Braun, *De Vestitu sacerdotum hebr.* 1680; Bw. Bredow, *Historische Untersuchungen*; Keferstein, *Mineralogia polyglotta*, Halle, 1849; Luther, *Die Bibel*; O., *Old Testament*; Aaron Pick, *The Bible Students' Concordance, to ascertain the literal meaning in the original*, 1845; R. *Revelations*; S. *Septuagint*; J. Jervis.

chalcedony. Further K. shows that though the word chrysolite denotes the colour, there is no means of identifying which of several suitable hard stones in the breastplate was signified, and the matter is shrouded with obscurity.

*Sappir*, translated sapphire, and *σάπφειρος* in S., is *sappir* in Chaldaea, *sophor* in Ethiopic, *saphiros* in Coptic, *saphiron* in Syriac, *sapphiros* in Latin. Given as sapphire by B. L. O. R. But K. authoritatively states that what was known to the Chaldeans, Greeks, and Romans under the name of sapphire was lapis lazuli. That mineral comes from Bokhara, and the district of Badakshan in Afghanistan, to the north of the Hindu Kush, not far from the upper course of the Oxus, whence it is taken by caravans to the lapidaries of Cambay.

*Jashpeh*, translated jasper, *ἵασπις* in S., is also called *jashpeh* in Persian and Syriac. Jasper occurs abundantly in many countries, including Syria, Egypt, etc., but is also extensively found and cut in Guzerat; it is recognised as such by B. L. O. R.; K. considers that plasma, or jasper, was intended here.

There are potent arguments in support of the conviction that all the foregoing stones in Aaron's Ephod were cut at Cambay, and thence taken to Egypt by regular trade, for it has been traced back to long before the Christian era.

Thence the commerce of the lapidaries of Cambay supplied all countries of the ancient world from China to Greece and Egypt: even at the present day it is hinted that much of what is sold in Western Europe in resorts of modern tourists has a like origin, having been worked and cut at Cambay.

*Akhlomoh*, translated amethyst, *ἀμέθυστος* in S., is amothostos in Ethiopic (whence the Greek name) and in Syriac; amethystos in Coptic; amethystus in Latin. It is so given by B. K. L. O. R. S.; all are concordant. It is abundant: amongst other countries, in India and Ceylon.

As to the identification of the other stones the greatest perplexity exists, and nothing positive can be ascertained.

*Boreketh*, translated carbuncle, from the Sanscrit Barak, shining, is the *σμαράγδος* in S., also *μάρμαρδος* in Greek; maragd in Ethiopic; marakta in Sanscrit; berakta and ismaragda in Chaldaea; barketh and zmerud in Persian; zumurud in Hindustani; zamaragd in Ethiopic, whence evidently the Greek; samurod in Arabic; smaragdus in Latin. Translated emerald by B. K. L. R. S. It is found in Egypt, whence the whole ancient world was supplied. Extensive traces of the ancient emerald mines on the Saburah, between Berenice and Koptos, were discovered in chlorite

schist by Caillaud. Emeralds also exist in Arabia Petraea, in the Ural mountains, and in the government of Irkutsk in Siberia, but they are not found in India. The name "carbuncle" is misapplied.

*Nophekh*, translated emerald, and *ἀνθραξ* in S., is anthrax in Coptic, whence the Greek; anthrax in Latin. Since no corresponding etymology to nophec is known to us, we have to follow the Septuagint rendering. Given erroneously as ruby by B. and L., considered to have been noble garnet, which has the appearance of burning coal, but decidedly not ruby, K. Precious or oriental garnet, almandine or carbuncle, comes from Jaipur and Rajputana in India, whence the ancients are surmised to have procured them; also from Ceylon and Pegu, and it occurs in isolated crystals in metamorphic schists, as is usual.

*Leshem* is translated ligure, and *λυγύριον* in S. It is leshem and jeshem in Persian, otherwise there is no affinity to the word in other languages, lygirion in Coptic; lincurios in Latin, rendered ligure by L., hyacinth by B.; K. considers it to signify reddish-brown tourmaline, common in India.

*Pitdoh* is translated topaz, and *τοπάzion* in S.; it is topaz as given by B. L. P. R. Supposing the etymology to originate from pitor, *i.e.*, the yellow in Sanscrit, K. infers it to denote some yellow Indian stone, such as yellow zircon, yellow spinel, or yellowish brown grossularia (cinnamon stone) but not yellow topaz, which is not found in Asia. He states that the Greek *τοπάzion*, topazion in Coptic, from the island of Topaza, was merely phosphorescent fluor spar.

*Tharsish*, translated beryl, and by *βερύλλιον* in S., which corresponds to beryl *βήρυλλος* in R. The word is thorsish in Syriac, but nothing analogous exists in other languages in order to guide us. In Greek it has been given as *θαρσεις* and translated *χρυσόλιθος*, from chrysolidos in Coptic. Beryl is a favourite ornamental stone, found in large crystals in Siberia, and is considered by K. to have been known to the ancients and to have been employed for the breastplate, but yet he gives both sardonyx or beryl as intended by shohan, as above. Tharsish is given as turquoise by L. evidently wrong; as chrysolite by B., likewise unsuited, since it is by no means clear what that word indicated; as amber on account of its colour Bw. and K. Though it is possible that amber, obtained by the Phoenicians through their emporium at Tarshish, or Cadiz, might have borne the name of that place, it does not occur among the foundations, while beryl does, and seems preferable, J.

There still remain three foundations in the Revelations to be identified, viz. chrysolite, topaz and hyacinth, in addition to some conjectures made already.

When Moses took the offering special mention is made of "*onyx* stones and *stones* to be set for the ephod and for the breastplate," for the Lord had spoken unto Moses on Mount Sinai, saying, speak unto the children of Israel that they bring me an offering for the tabernacle, and besides metals and other requisites were specified "*onyx* stones and stones to be set in the ephod and in the breastplate." Bezaleel and Aholiab "wrought *onyx* stones inclosed in ouches of *gold*, graven as signets are graven, with the names of the children of Israel, and he put them on the shoulders of the ephod, that they should be as *stones* for a memorial to the children of Israel." And in the breastplate they set four rows of stones: the first row was a *sardius*, a *topaz*, and a *carbuncle*; and the second row an *emerald*, a *sapphire*, and a *diamond*; and the third row a *figure*, an *agate*, and an *amethyst*; and the fourth row a *beryl*, an *onyx*, and a *jasper*. (Ex. xxv, 7; xxviii, 15-21; xxxv, 9; xxxix, 6, 10-13.)

B.C. *circum* 1015. In describing to Solomon the things he had prepared for the temple David specifies among the rest "*onyx* stones, and *stones* to be set, *glistering* stones, and of divers colours, and all manner of *precious* stones, and marble stones [*? oriental alabaster*] in abundance." (I Chron. xxix, 2.)

The servants of Hiram and Solomon brought *precious* stones from Ophir, as well as gold; the queen of Sheba likewise brought Solomon *precious* stones. (II Chron. ix, 1, 10.)

B.C. 588. We learn that Tyre procured certain *precious* stones through Syria. "Syria was thy merchant by reason of the multitude of the wares of thy making; they occupied thy fairs with *emeralds* (*oriental garnet ? see ante*), purple and brodered work, and fine linen, and coral and *agate*" (*Kadkud*), supposed to have been zircon, garnet, or tourmaline, but not certain, K. Take up a lamentation upon the king of Tyrus and say unto him, "Thou hast been in Eden, the garden of God; every precious stone was thy covering. the *sardius* (noble carnelian) the *topaz* (zircon, garnet, tourmaline) and the *diamond* (chrysoprase?) the *beryl*, the *onyx*, the *jasper*, the *sapphire* (lapis lazuli), the *emerald* (carbuncle or precious garnet?), *carbuncle* (emerald) and gold." (Ezek. xxvii, 16, 22; xxviii, 13.)

## PRECIOUS STONES SYMBOLICALLY.

B.C. 1491. Moses was commanded to go with Aaron, Nadab and Abihu and seventy of the elders of Israel to worship afar off at the foot of Mount Sinai, while only Moses was suffered to go near the Lord: then they went as far as they were permitted, "and they saw the God of Israel and there was under his feet as a paved work of *sapphire* stone (lapis lazuli) and as it were the body of heaven in his clearness." (Ex. xxiv, 10.)

In describing the incomparable value of wisdom Job exclaimed, "It cannot be valued with the gold of Ophir, and the precious *onyx*, or the *sapphire* (lapis lazuli); the gold and the *crystal* (*zekhuketh*) crystal-like glass? (P.) cannot equal it and the exchange of it shall not be for jewels of fine gold. No mention shall be made of coral or pearls, for the price of wisdom is above rubies (*penenem*): this is not a stone at all, but is considered by Gesenius, K. and other authorities to be red coral.

B.C. *circum* 712. Prophesying the extension of Christ's Church, Isaiah says, "Oh thou afflicted, tossed with tempest, and not comforted, behold I will lay thy stones with fair colours, and thy foundations with *sapphires* (lapis lazuli) and I will make thy windows of *agates* (kudkud, conjectured to be zircon, garnet or tourmaline, K.), and thy gates of *carbuncles* (ekdokh, an uncertain fiery gem) and all thy borders of pleasant stones." (Is. liv, 11, 12.)

B.C. *circum* 595. The prophecy of Ezekiel opens with a magnificent heavenly vision of four living creatures which came out of a great cloud and a fire, "and out of the midst thereof as the colour of amber, out of the midst of the fire." And as he beheld them behold one wheel upon the earth by the living creatures. The appearance of the wheels and their work was like unto the colour of a *beryl*; and the likeness of the firmament upon the heads of the living creatures was as the colour of the terrible *crystal* stretched forth over their heads above. And above the firmament that was over their heads was the likeness of a throne, as the appearance of a *sapphire* stone (lapis lazuli). And I saw as the colour of amber, as the appearance of fire round about within it" (Ezek. i, 4, 16, 26). The word *zekhuketh* employed here in both cases does not signify amber, but a precious alloy of copper and gold or of gold and silver, so in Ezek. viii, 2.



ADAMANT (*Diamond—Shomir*) SYMBOLICALLY.

B.C. *circum* 595. When the Lord sent Ezekiel to reprove the house of Israel of their sins he said, "They will not hearken unto thee"; "Behold I have made thy face strong against their faces, as *adamant*, harder than flint." (Ezek. iii, 9.)

B.C. 518. Thus speaketh the Lord: "They refused to hearken, yea they made their hearts as an *adamant* stone." (Zech. vii, 12.)

FLINT (*Khalomesh*).

In the English translation the word flint occurs seven times in the Old Testament, though in Is. v, 28, and Ezekiel iii, 9, it is simply *tsur*, a rock, in the original, while in the other passages it is *khalomesh*, which is conjectured to signify flint by K. But the rendering of the S. is unquestionably the right one, being in all cases general as *πέτρα*, a rock, but never *πέτρος*, a stone, "Who brought thee out of the rock of *flint*." "He made him to suck honey out of the *rock*." [Hebrew, *khalomesh*.] (Deut. viii, 15; xxxii, 13). "He putteth forth his hands upon the *rock*." [Hebrew, *flint*.] (Job. xxviii, 9). "Which turned the rock into a standing water, the *flint* into a fountain of waters." (Ps. cxiv, 8). "I have set my face like a *flint*." (Is. 50, 7.)

SALT (*Melakh*).

B.C. *circum* 1917. In the days of Amraphel, King of Shinar, Arioch, King of Ellasar, Chedorlaomer, King of Elam, and Tidal, king of nations, these made war with Bera, King of Sodom, with Birsha, King of Gomorrah, Shinab, King of Admah, and Shemeber, King of Zebaiim, and the King of Bela, which is Zoar. "All these were joined together in the vale of Siddim, which is the *salt sea*." (Gen. xiv, 3.)

B.C. 1898. The sun was risen upon the earth when Lot entered Zoar; then the Lord destroyed the cities of Sodom and Gomorrah and all the inhabitants of the plain. "But his wife looked back from behind him, and she became a pillar of *salt*." [Was incruised.] (Gen. xix, 26.)

B.C. *circum* 1490. "Every oblation of thy meat offering shalt thou season with *salt*, neither shalt thou suffer the *salt* of the covenant of thy God to be lacking from thy meat offering; with all thine offerings thou shalt offer *salt*."

B.C. *circum* 1040. "David gat him a name when he returned from smiting of the Syrians in the *valley of salt*, being 18,000 men."

In the days of David "Abishai, the son of Zeruiah, slew of the Edomites in the *valley of salt* 18,000." (II Sam. viii, 13. I Chron. xviii, 12.) Two accounts of same battle.

B.C. 896. The men of Jericho said unto Elisha, The situation of this city is pleasant, but the water is naught. "And he said, bring me a new cruse, and put *salt* therein, and they brought it to him. And he went forth unto the spring of the waters, and cast the *salt* in there, and said, Thus saith the Lord, I have healed these waters; so the waters were healed." (II Kings ii, 20, 21.)

B.C. *circum* 827. Amaziah, King of Judah, slew of Edom in the *valley of salt* 12,000." (II Kings xiv, 7.)

B.C. *circum* 630. As I live, saith the Lord of hosts, the God of Israel, surely Moab shall be as Sodom, and the children of Ammon as Gomorrah, even the breeding of nettles, and *salt* pits, and a perpetual desolation." (Zeph. ii, 9.)

B.C. 519. Darius made a decree to facilitate the progress in the erection of the temple, that of the King's good, even of the tribute beyond the river, including that which was necessary "for the burnt offerings of the God of heaven, wheat, *salt*, wine, and oil, according to the appointment of the priests which are at Jerusalem, let it be given them day by day without fail." (Ezra vi, 9.)

B.C. *circum* 457. Artaxerxes made a decree to all the treasurers which were beyond the river that whatsoever Ezra the priest should require of them should be done speedily, including "*salt*, without prescribing how much." (Ezra vii, 22.)

#### SALT SYMBOLICALLY.

Overwhelmed with grief, Job exclaimed, "Can that which is unsavoury be eaten without *salt*?" (Job vi, 6.)

B.C. 957. There was war between Abijah, king of Judah, and Jeroboam, king of Israel. The former set the battle in array with 400,000 chosen valiant men of war, the latter with 800,000 chosen mighty men of valour. And Jeroboam stood upon mount Zemaraim, which is mount Ephraim, and said Hear me, thou Jeroboam, and all Israel, "Ought ye not to know that the Lord God of Israel gave the kingdom over Israel to David for ever, even to him and his sons by a covenant of *salt*." (2 Chron. xiii, 5.)

#### SULPHUR (*Gophrēth*) AND BITUMEN (*Zepheh*).

B.C. 1898. "The Lord rained upon Sodom and Gomorrah *brimstone* (sulphur) and from the Lord out of heaven." (Gen. xix, 24; xiv, 10.)

## GOLD, SILVER, IRON, LEAD, TIN.

Although mention is made of several minerals with reference to the Garden of Eden, it by no means implies that their existence there was known before the Flood. "A river went out of Eden to water the garden; and from thence it was parted, and became into four heads. And the name of the first is Pison, that is it which compasseth the whole land of Havilah, where there is *gold*, and the *gold* of that land is good: there is bdellium (*bēdulakh*, by some considered a transparent gum of sweet scent; rendered *ἀνθράξ* in the Septuagint, which is considered by Keferstein to signify noble garnet), and the *onyx* stone" (sardonyx? T., beryl? K.). (Gen. ii, 11, 12.)

Job shows his acquaintance with mines, saying, "Surely there is a vein for the *silver* (margin: mine) and a place for *gold* where they find it. *Iron* is taken out of the earth, and *brass* (*nekhusheth*, copper) is molten out of the stone. He setteth an end to darkness, and searcheth out all perfection, the stones of darkness and the shadow of death." As for the earth "the stones of it are the place of *sapphires* (*lapis lazuli*), and it hath *dust of gold* (gold ore). There is a path which no fowl knoweth, and which the vulture's eye hath not seen: the lion's whelps have not trodden it, nor the fierce lion passed by it. He putteth forth his hand upon the rock, he overturneth the mountains by the roots; he cutteth out rivers among the rocks, and his eye seeth every precious thing; he bindeth the floods from overflowing, and the thing that is hid bringeth he forth to light." (Job xxviii, 1, 6-11.)

It is certain that Job, living as he did in the great alluvial plain near the mouth of the Euphrates, had no personal knowledge of the mines situated in mountainous countries; his accounts of them were derived from others. This passage is the graphic poetical conception he formed of mining operations, beautiful, but perhaps the English translation does not do him justice.

COPPER, IN ALL CASES *nekhusheth*.

Copper, erroneously translated brass, occurs in 120 verses of the Old Testament, besides being arbitrarily mentioned four times as steel.

## COPPER AS PERSONAL PROPERTY.

Copper and iron are the only two metals of which the extraction from their ores by metallurgical processes is

recorded before the Flood. It will be desirable to suspend allusions to the close reasons for adopting the true signification copper, which is the only correct translation of the Hebrew word *nekhusheth*, as *opheret*, or *bronze*, does not occur in the Old Testament; they had better be stated later on, showing how the error originated.

Tubal Cain, of the seventh generation from Adam, "was an instructor of every artificer in *brass* and iron" (Gen. iv, 22). Nor is it possible to imagine that the trees could have been felled and worked to build the enormous Ark, without the use of these metals, which were likewise required for the nails and sundry other fittings.

B.C. 1452. When the children of Israel spoiled the Midianites—the descendants of Ishmael—they were commanded that "the gold, the silver, the *brass*, the iron, the tin, and the lead, everything that may abide the fire, ye shall make it go through the fire, and it shall be clean." (Numb. xxxi, 22.)

B.C. 1444. Joshua blessed the half tribe of Manasseh, and spake to them, saying, "Return with much riches unto your tents . . . with silver, and with gold, and with *brass*, and with iron." (Josh. xxii, 8.)

B.C. *circum* 1120. The Philistines took Samson, "and put out his eyes, and brought him down to Gaza, and bound him with fetters of *brass*." (Judg. xvi, 21.)

B.C. *circum* 1063. "There went out a champion out of the camp of the Philistines, named Goliath, of Gath, whose height was six cubits and a span, and he had an helmet of *brass* upon his head; and he was armed with a coat of mail, and the weight of the coat was 5,000 shekels of *brass*; and he had greaves of *brass* upon his legs, and a target (margin: gorget) of *brass* between his shoulders." (1 Sam. xvii, 5, 6.)

B.C. 1014. Solomon had twelve officers over all Israel, which provided victuals for the King and his household. "The son of Geber in Ramoth-Gilead, to him pertained the towns of Jair, the son of Manasseh, which are in Gilead, to him also pertained the region of Argob, which is in Bashan, three score great cities, with walls and *brassen* bars" . . . (1 Kings iv, 13). See also 1 Kings xiv, 27; II Kings xxv, 7, and Ezek. xxvii, 13.

#### COPPER WITH REFERENCE TO THE TABERNACLE.

B.C. 1491. The Lord spoke unto Moses, saying, Speak unto the children of Israel that they bring me an offering: "this is

the offering that ye shall take of them, gold, and silver, and *brass*." (Ex. xxv, 3); also xxvi, 11; xxxvii, 2-19, etc.

At the taking of Jericho, Joshua commanded that all the silver and gold, and vessels of *brass* and iron are consecrated unto the Lord; they shall come into the treasury of the Lord. And they burnt the city with fire, and all that was therein; only the silver and the gold, and the vessels of *brass* and of iron they put into the treasury of the house of the Lord." (Josh. vi, 19, 24.)

B.C. 1042. David made him houses in the city of David, and prepared a place for the ark of God, and pitched for it a tent . . . The singers Heman, Asaph, and Ethan, were appointed to sound with cymbals of *brass*." (1 Chron. xv, 19.)

#### COPPER IN CONNECTION WITH THE TEMPLE.

B.C. *circum* 1040. David smote Hadarezer, King of Zobah, unto Hamath: from Tibhath, and from Chun, cities of Hadarezer, brought David very much *brass*, wherewith Solomon made the *brassen* sea, and the pillars, and the vessels of *brass*.

"David prepared iron in abundance for the nails of the doors of the gates, and for the joinings, and *brass* in abundance without weight. David called for Solomon his son, and charged him to build an house for the Lord God of Israel, and said, "I have prepared for the house of the Lord 100,000 talents of gold, and 1,000 talents of silver, and of *brass* and iron without weight, for it is in abundance. Of the gold, the silver, and the *brass*, and the iron there is no number." Furthermore, David said, "I have prepared with all my might for the house of my God . . . *brass* for the things of *brass*." When he consigned to Solomon all the metal for the Temple he gave, "of *brass*, 18,000 talents." (1 Chron. xxii, 3, 14, 16; xxix, 2, 7.)

In the account of the building of the Temple by Solomon we find mention of Hiram (or Hiram) king of Tyre, and of his son, also called Hiram: we would now speak of Hiram the first and Hiram the second. The latter sent Solomon the son of a widow, a cunning head artificer, technically acquainted with metal work and textile industries, whose name was likewise Hiram, which might have been common at Tyre. No one must suppose that the king would have gone to Jerusalem leaving his throne, to work as the superintendent of the building of the temple!

In reference to the molten sea, an article on weights and measures, by an atheist writer, appeared in the *Westminster Review* for 1832, scoffingly tending to prove that Solomon or

his historians know no nearer proportion of the circumference of a circle to the diameter than three to one. The writer's honoured father, Lt.-Col. Thomas Best Jervis, of the Bombay Engineers, F.R.S., then a young man in India, heartily took up the matter to sustain the accuracy of the inspired narrative. He showed that the Jewish cubit (Heb. *Amma*, as the mother of all measures) being the 72 millionth part of the earth's circumference, the capacity of the molten sea divided by 2,000 gives the contents of the Jewish bath; and since the Roman measures of capacity were derived from the Temple of Jerusalem, the bath held exactly 60 Roman pounds of distilled water.

He proved by the higher mathematics that the brazen sea was of an oblate spheroidal form, *i.e.*, the half of a solid generated by the revolution of an ellipse on its conjugate axis, the conjugate remaining fixed, because the depth is stated to be half the length of the transverse, the mutual relation of the several numbers implying as perfect a knowledge of the ratio of the diameter to the circumference as we now possess. In one instance, it is said, "it contained 2,000 baths," in the other "it received and held 3,000 baths," where the superadded expression *makhzik* is derived from the root *khazuk*, to hold, to overpower, to prevail over, employed when David prevailed over Goliath, intimating something heaped up. A vessel of the form mentioned would contain precisely one-half more heaped corn than water. The first instance gives the liquid capacity of 2,000 baths, the second a dry measure of 3,000 baths.\*

B.C. 1001. "Solomon made a *brazen* scaffold of five cubits long and five cubits broad and three cubits high, and had it set in the midst of the court, and upon it he stood and kneeled down upon his knees before all the congregation of Israel, and spread forth his hands to heaven." (II Chron. vi, 13. See also *ibid.* xxiv, 12.)

#### COPPER CARRIED AWAY FROM THE TEMPLE.

B.C. 588. At the siege of Jerusalem by Nebuchadnezzar "the pillars of *brass* that were in the house of the Lord, and the bases, and the *brazen* sea that was in the house of the Lord the Chaldeans brake, and carried all the *brass* of them to Babylon, the chaldrons also, and the shovels, and the snuffers, and

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\* Captain Jervis, *Records of Ancient Science, exemplified and authenticated in the Primitive Universal Standard of Weights and Measures* Calcutta, 1835.

the bowls, and the spoons, and all the vessels of *brass* wherewith they ministered, took they away; the two pillars, one sea, and the 12 *brasen* bulls that were under the bases, which king Solomon had made in the house of the Lord; the *brass* of all these vessels was without weight. And concerning the pillars, the height of one pillar was 18 cubits, and a fillet of 12 cubits did compass it, and the thickness thereof was 4 fingers, it was hollow: and a chapter of *brass* was upon it; and the height of one chapter was 5 cubits, with network and pomegranates upon the chapters round about; all of *brass*." (Jer. lii, 17, 18, 20, 22; see likewise parallel passage in II Kings xxv, 13, 14, 16, 17.)

#### COPPER IN RELATION TO IDOLATRY.

B.C. *circum* 726. Hezekiah did that which was right in the sight of the Lord. "He removed the high places, and break the images (margin: statues), and cut down the groves, and break in pieces the *brasen* (copper) serpent which Moses had made, for unto those days the children of Israel did burn incense to it, and he called it *nehushtan* (i.e., a piece of copper)." (II Kings xviii, 4.)

B.C. *circum* 538. At the great feast which Belshazzar gave to 1,000 of his lords, the golden vessels taken from the Temple were brought in, and they drank wine in them. And they praised the gods of gold, and of silver, and of *brass*, etc. (Dan. v, 4, 23.)

#### COPPER PROPHETICALLY.

B.C. 1451. Before his death Moses blessed each of the tribes of the children of Israel separately. Of Asher he said, Let Asher be blessed with children, let him be acceptable to his brethren, and let him dip his foot in oil; "thy shoes shall be iron and *brass*." (Deut. xxxiii, 25.)

B.C. *circum* 712. "Thus saith the Lord to his anointed, to Cyrus, whose right hand I have holden, to subdue nations before him. I will go before thee, and make the crooked places straight; I will break in pieces the gates of *brass*, and cut in sunder the bars of iron." (Is. xlv, 2.)\*

B.C. 519. In a vision Zechariah "lifted up his eyes and looked, and behold there came four chariots from between two mountains, and the mountains were *brass*." (Zech. vi, 1.)

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\* See also ref. to *brass*, Numb. xxi, 9; Job xli, 27; Psa. cvii, 16; Ezek. ix, 2; xxiv, 11; Dan. ii, 32, etc.; iv, 15, 23; vii, 19; x, 6.

## COPPER SYMBOLICALLY.

B.C. 1451. After coming down from Mount Sinai Moses proclaimed to the assembly of the children of Israel, these are the commandments, the statutes, and the precepts which the Lord your God commanded to teach you, therefore thou shalt keep the commandments of the Lord thy God, to walk in his ways and fear him, for the Lord thy God bringeth thee into a good "land, whose stones are iron, and out of whose hills thou mayest dig *brass*." (Deut. viii, 9.)

## COPPER SYMBOLICALLY, ERRONEOUSLY RENDERED STEEL IN THE ENGLISH TRANSLATION.

It is difficult to understand the reason why the word steel has been erroneously applied in the following four passages instead of brass (copper) in the English translation, the more so as in two of the passages iron is likewise mentioned and correctly rendered. In the Septuagint version the iron and brass are clearly translated in both cases as *σίδηρος* and *χάλκος*. It is superfluous to add that copper swords and weapons were used before iron ones. Even in the prehistoric lacustral stations on the lake of Neuchâtel, the weapons were of copper, tempered almost as hard as steel, an art in which ancient nations excelled, but which has been long lost, although competent men have recently endeavoured to discover the process. Moreover the Phœnicians, Romans, and other people subsequently employed bronze, or copper alloyed with tin, but brass, an alloy of copper and zinc, was a very late discovery, the ores of zinc having been unknown to the ancients. Diodati translates rame (copper) in the Italian version; in Ostervald's French version it is rendered airain, but in that of Martin it is acier, in Jer. xv, 12, and in the other passages airain; Luther translates eherne, except in Jer., where he gives Erz, both which words are employed sometimes for copper, and at other times for bronze or brass; in Dutch version stal (steel), except in Jer., where it is rendered koper; the Vulgate uses "æneus."

## FINE COPPER, PRECIOUS AS GOLD.

Much conjecture arises as to what is here meant, and nothing can be decided satisfactorily, for the description is vague.

B.C. *circa* 457. Before starting for Babylon at the end of the captivity, to return to Jerusalem, Ezra separated twelve



of the priests, to whom he weighed the silver and gold, and the vessels of the house of God which the King, his counsellors and his lords, and all Israel there present had offered, "and two vessels of *fine* copper, *precious as gold*." (Ezra viii, 27.) The words in the Septuagint read *σκεύη χαλκοῦ στιλβοντος αγαθον διάφορα ἐπιθυμητὰ ἐν χρυσίῳ*, vessels of good and excellent glittering copper, desirable as gold: they are variously interpreted: the Vulgate gives *Vasa æris fulgenti optimi duo, pulcra ut aurum*, as beautiful as gold; the French translation of Martin, *d'un bel airain fin, brillant comme l'or, et aussi précieux que l'or*; Luther's German version, *Ehernen köstliche Gefässe, lauter wie Gold*; precious brass (or copper) vessels, pure as gold; the Dutch translation is clearer, *twee vaten van blinkend goed koper, begeerlijk als goud*, two vessels of brilliant copper, desirable as gold.

Brass appears by no means to fulfil these requirements, nor even bronze, it seems to indicate a beautiful alloy of copper and gold, of peculiar brilliancy, such as has ever been made with marvellous perfection in Japan, and perhaps obtained from thence.

#### IRON, BARZEL, AS PERSONAL PROPERTY.

Tubal Cain, "an instructor of every artificer in brass and iron," lived long before the Flood. (Gen. iv, 22.)

When the Israelites spoiled the Midianites, among the metals they were commanded to purify by passing through the fire mention is made of *iron*. (Numb. xxxi, 22. See *ante* under copper.)

B.C. 1451. The Lord spake unto Moses in the plains of Moab, by Jordan, near Jericho, saying, "There shall be six cities for refuge, which ye shall appoint for the manslayer . . . both for the children of Israel and for the stranger, and for the sojourner among them, that everyone that killeth any person unawares may flee thither. And if he smite him with an instrument of *iron*, so that he die, he is a murderer: the murderer shall surely be put to death. But if he thrust him suddenly without enmity, or have cast upon him anything without lying in wait, or with any stone wherewith a man may die, seeing him not, and cast it upon him, that he die, and was not his enemy, neither sought his harm, the congregation shall deliver the slayer out of the hand of the revenger of blood." (Numb. xxxv, 16.)

In recounting to the children of Israel all God's marvellous deliverance of them he said, "Only Og, king of Bashan,

remained of the remnant of the giants : behold his bedstead was a bedstead of *iron* ; is it not in Rabbath, of the children of Ammon ? Nine cubits was the length thereof, and four cubits the breadth of it." (Deut. iii, 11.)

Moses commanded the children of Israel, "When ye be gone over Jordan ye shall set up these stones in mount Ebal. There shalt thou build an altar unto the Lord thy God, an altar of stones : thou shalt not lift up any *iron* tool upon them." (Deut. xxvii, 5.) Joshua built this altar in mount Ebal, as Moses commanded, "an altar of whole stones, over which no man hath lift up any *iron*." (Josh. viii, 31.)

As has been mentioned under brass, at the taking of Jericho the children of Israel were commanded utterly to destroy everything, but only the metals, including "*iron*," are consecrated unto the Lord, they shall come into the treasury of the Lord, and the vessels of brass and of *iron* they put into the treasury of the house of the Lord." (Josh. vi, 19, 24.)

B.C. 1444. The children of Joseph answered Joshua that the tract of country allotted to them in mount Ephraim was not enough for them, "and all the Canaanites that dwell in the valley have chariots of *iron*. Joshua spake unto the house of Joseph, even to Ephraim and to Manasseh, saying, Thou art a great people, and hast great power ; thou shalt drive out the Canaanites, though they have *iron* chariots, and though they be strong." (Josh. xvii, 16, 18). Joshua blessed the half tribe of Manasseh, and spake to them, saying, "Return with much riches unto your tents . . . with silver, and with gold, and with brass, and with *iron*." (Josh. xxii, 8.)

B.C. *circum* 1425. "The Lord was with Judah, and he drave out the inhabitants of the mountain, but could not drive out the inhabitants of the valley, because they had chariots of *iron*." (Judg. i, 19.)

B.C. *circum* 1316. The children of Israel again did evil in the sight of the Lord, and the Lord sold them into the hand of Jabin, King of Canaan, that reigned in Hazor, the captain of whose host was Sisera. "And the children of Israel cried unto the Lord, for he had 900 chariots of *iron*, and 20 years he mightily oppressed the children of Israel." (Judg. iv, 3. See also *ibid.* iv, 13 ; I Sam. xvii ; II Kings vi, 6 ; Ezek. xxvii, 12, 19 ; II Sam. xxiii, 7.)

#### IRON IN RELATION TO THE TEMPLE.

B.C. 1015. "David prepared *iron* in abundance for the nails of the doors of the gates and for the joinings" of the temple.

See under gold for the account David gave Solomon of the materials he had prepared for the erection of the Temple, which included "brass and *iron* without weight." Then the chief of the fathers offered willingly, including "100,000 talents of *iron*." (1 Chron. xxii, 3, 14, 16; xxix, 2, 7.)

Solomon sent to Hiram, King of Tyre, requesting him to send him a man cunning to work "in *iron*" and in other metals. To which Hiram replied that he had sent Solomon a man skilful to work "in *iron*," etc. (11 Chron. ii, 7, 14.)

B.C. 1012. In the 480th year after the children of Israel were come out of Egypt, Solomon began to build the Temple. "And the house when it was in building was built of stone made ready before it was brought thither, so that there was no hammer or axe, nor any tool of *iron* heard in the house while it was in building." (1 Kings vi, 7.)

B.C. 856. About three centuries after the building of the Temple it greatly required repair, on account of the injuries it had sustained from enemies of the Jews, and King Joash concerted with Jehoida the priest to collect the needful money, which they paid to such as did the service of the house of the Lord, "and such as wrought *iron* and brass, to mend the house of the Lord." (11 Chron. xxiv, 12.)

IRON SYMBOLICALLY. Job xl, 18; xli, 7 (*passim*).

Complaining of the cruel reproaches of his friends, Job cried, "Oh that my words were now written! Oh that they were printed in a book! that they were graven with an *iron* pen and lead in the rock for ever!" (Job xix, 24.)

Zophar the Naamathite said to Job as a reproach, "Knowest thou not that the triumphing of the wicked is short, and the joy of the hypocrite but for a moment, he shall flee from the *iron* weapon, and the bow of steel (copper) shall strike him through." (Job xx, 24.)

The Lord spake unto Job out of the whirlwind, saying, "Behold behemoth, which I made with thee, his bones are as strong pieces of brass, his bones are like bars of *iron*. Canst thou draw out leviathan with an hook? Canst thou fill his skin with barbed *irons*, or his head with fish spears? The sword of him that layeth at him cannot hold, the spear, the dart, nor the habergeon (margin: breastplate). He esteemeth *iron* as straw, and brass as rotten wood" (Job xl, 18; xli, 7, 27.)

Altogether iron is mentioned in 82 verses of the Old Testament.

LEAD, *Uphoreth*, AS PERSONAL PROPERTY.

B.C. 1452. After the spoiling of the Midianites, among the metals which the children of Israel were commanded to go through the fire, it has been seen that mention is made of "the lead." (Numb. xxxi, 22.)

B.C. 588. Among the products with which Tarshish traded in the fairs of Tyre mention is specified of "*lead*." (Ezek. xxvii, 12—see under precious stones.)

Lead is extremely abundant in Spain, besides all which the Phœnicians brought by sea to Tarshish from Cornwall and Brittany.

## LEAD SYMBOLICALLY.

B.C. 1491. "Pharaoh's chariots and his host hath he cast into the sea. Thou didst blow with thy wind: they sank as *lead* in the mighty waters." (Ex. xv, 10.) Also Job xix, 24; Jer. vi, 29; Ezek. xxii, 18; xxvii, 12; Zech. v, 7, 8.

TIN, *bedel*, AS PERSONAL PROPERTY.

B.C. 1452. As already quoted, all the metal taken by the children of Israel when they spoiled the Midianites they were commanded to purify, by making it go through the fire; and among the rest was *tin*. (Numb. xxxi, 22.)

B.C. 588. Tarshish traded in the fairs of Tyre with *tin*. (Ezek. xxvii, 12.)

The Sanscrit name is *kytira*; much tin is found in Malacca, and the Phœnicians are conjectured to have procured it thence.

Tin mines exist in Portugal, but besides it is well known that the Phœnicians obtained their tin from Cornwall, the ancient Cassiterides, a name derived from the Greek *κασσίτερος*, tin. The tin mines of central France then supplied the prehistoric dwellers of the lacustral towns of Helvetia, and ingots of metallic tin have been found in them near the town of Neuchâtel, in the lake. It would appear that the Phœnicians were the first people to discover and employ bronze, the alloy of tin with copper, so far back as the time of Moses, since the Midianite merchants must have obtained from them the tin of which we read, doubtless to make bronze. There is not the slightest shadow of probability that the Jews ever employed tin in all their history: the words lead and tin do not occur in the New Testament.

## TIN SYMBOLICALLY.

B.C. *circum* 760. "Hear, O heavens, and give ear, O earth; Wash you, make you clean; put away the evil of your doings

from before mine eyes; cease to do evil, and I will turn mine hand upon thee, and purely purge away thy dross, and take away thy *tin*." (Is. i, 25.)

B.C. 593. "The house of Israel is to me become dross: all they are brass and *tin*, etc. As they gather silver and *tin*, etc., into the midst of the furnace to melt it: so will I gather you in mine anger and my fury." (Ezek. xxii, 18, 20.)

#### GENERAL DEDUCTIONS.

The generic word for gold is *zohov*, poetically *khörüts*; *kethem* is pure gold; *poz* and *zohov zukok* signify refined gold, and *zohov tohūr*, clean, pure gold; *toūraiph* is a refiner; *keseph nivkhar*, choice silver.

Alas! Abraham contracted in Egypt the (to him) useless passion of amassing great wealth of the precious metals, a lesson too faithfully learned throughout all ages by his descendants and non-descendants. Amongst the most ancient arts was that of extracting and refining the precious metals. Job speaks of God trying him, to come forth as gold. The working of them was familiar to the Israelites in Egypt, for they were so skilful in casting the golden calf, even in the wilderness.

At the fourth International Geographical Congress, at London, 1890, Mr. Bent exhibited the model of a most interesting group of stone buildings in Mashonaland, with which the writer was so remarkably impressed, from their wonderful analogy to the Phœnician *nuraghi* he had visited in Sardinia, that he pointed out the fact to him. Mr. Nicol Brown speaks of hundreds of ancient ruined structures in proximity to hundreds of shallow gold mines, less than 100 feet deep, and which are being now sunk still deeper on the same lodes. The ruins of ancient gold-smelting furnaces have been identified, even the crucibles and blowpipes with traces of gold still adhering to them, and Mr. Bent figures an astragalus-shaped ingot mould, corresponding to the *wedge* of Ophir, perhaps weighing a talent of gold? Mr. Brown, amongst others, is fully convinced that this is the Ophir whence Hiram procured the gold for Solomon; and the expression *wedge* clearly points out the acquaintance that Tyre possessed of the mining and metallurgy of gold. No wonder that Tyre should heap up gold as the mire of the streets. At the present time not a trace remains of the ancient native population, entirely exterminated, for in *none of the many languages* of South Africa is there a word signifying gold.

The gold of Ophir is mentioned by Eliphaz and Job; four times in connection with Solomon, and once with Jehoshaphat; once in the Psalms, and once in Isaiah as fine gold and the *wedge* of Ophir.

The gold of Sheba—somewhere south of Abyssinia—is mentioned by David in his prayer for Solomon, and allegorically of the glory of the church in Isaiah: the merchants of Sheba took gold to the fairs of Tyre.

God speaking by Jeremiah says that the idols of the heathen were made of silver from Tarshish and gold from Uphaz, and in a vision Daniel saw a certain man whose loins were girded with fine gold of Uphaz. Gold was also obtained from Parvaim, and especially through Tarshish, whence came gold, apes and peacocks. Caranza points out the abundance of peacocks in Andalusia, the apes were from Africa.

*Pure gold* was exclusively employed for the tabernacle by special command given to Moses by God for all which pertained to His worship: for the ark, the mercy seat, the table, with all the vessels upon it, the candlestick and its accessories, the altar of incense, the chains and bells of the ephod, the chains of the breastplate, the plate with the signet; in all these passages the original reads *zohov tohūr*, clean, pure gold.

David valued the judgments of the Lord more than much fine gold. The righteous are compared to fine gold (*kethem*), and refined gold (*poz*) in the lamentations of Jeremiah, while Solomon declared the gain of wisdom to be better than fine gold (*khörüts*, pure gold), choice gold (*poz*, refined gold) and choice silver (*keseph nivkhar*), and to this latter he compares the tongue of the just.

Silver (*keseph*) was early refined in a clay cupel, and melted to oxidize and separate the lead as *dross*, or litharge; David speaks of silver *tried* in a furnace of earth and of his being tried as silver is *tried*. In two passages Solomon mentions the *fining-pot* for silver, and the *furnace* for gold, and alludes to the residual litharge adhering to the broken cupel, as a *potsherd* covered with silver *dross*: he also refers symbolically to the separation of the litharge, saying, "Take away the *dross* from the silver, and there shall come forth a vessel for the *finer*. God says of the wicked thy silver is become *dross*. *Reprobate* (rejected) silver shall they call them; and elsewhere, I have *refined* thee, but not with silver, I have chosen thee in the furnace of affliction. The Lord foretold by Zechariah, I will refine Jerusalem, as silver is *refined*, and try them, as gold is *tried*."

God commanded His chosen people purity in everything: purity of food, unmixed woven clothes, washing from uncleanness, and purity in the metals they employed, as symbolical of purity of heart. The refining of metals is frequently mentioned and applied spiritually, while other nations, such as the Phœnicians and Midianites, employed alloys. The smelting of these when obtained from pagan nations is always enforced; for alloys, like whatsoever mixture, symbolized sin. Pagan nations employed the precious metals, principally on account of their superior value, for their idols; not for the sake of purity, for they likewise had idols of less value of brass, iron, stone and wood. On their leaving Egypt, the Jews were commanded: "Ye shall not make with me gods of silver, neither shall ye make unto you gods of gold." (Ex. xx, 23.) See also Ps. cxv, 4; Is. ii, 20; xl, 19; Zech. xiii, 9.

The weights of the metals offered to Moses for the making of the tabernacle were: gold 1,750 shekels; silver 100 talents 1,775 shekels; brass (copper) 70 talents 2,400 shekels, after the shekel of the sanctuary, double the ordinary one.

Mention is made of gold in 383 verses of the Old Testament; of silver, in 263 verses; of iron in 82; of lead in 7; of tin in 4.

The thanks of the meeting having been passed to the author, the Chairman invited discussion.

#### DISCUSSION.

The SECRETARY (Professor HULL, F.R.S.) said he would have great pleasure in conveying the thanks of the meeting to the distinguished author of the paper. He had himself, at the request of Mr. Spottiswoode, some years ago, tried to determine the representatives at the present day of the precious stones of Aaron's breastplate; but without much success. Of one stone, "the diamond," he felt confident that the translation ought to have been *rock crystal* or *quartz*, as the diamond (adamant) being the hardest of all stones, it must have been used for engraving the names of the tribes on the other stones. Then again it was remarkable that the turquoise was not mentioned, although the turquoise mines were

worked at Sarabit-el-Khadim in the Sinaitic peninsula by the Pharaohs before the Exodus. These mines are in the "Nubian Sandstone" formation, and have been investigated and described by the officers of the Ordnance Survey of Sinai, in their magnificent volumes, and more recently by Professor Flinders Petrie. The turquoise being a blue stone, it was probably the same as that designated as the "sapphire." The author had bestowed great labour on this paper—and probably there is nothing more to be said on the subject.

#### REMARKS BY LIEUT.-COLONEL MACKINLAY.

With reference to the words "a land whose stones are iron" (Deut. viii, 9), it has been remarked that no iron ore is to be found in Palestine; but the promised land extends from the Nile, the Mediterranean Sea and Lebanon to the Euphrates (Gen. xv, 18, Deut. i, 7, xi, 24), and in that larger district it is most probable that iron ore exists.

The metals lead and tin are only alluded to nine and five times respectively in the Scriptures; but gold, silver, brass (or copper) and iron are often mentioned, gold about 400 times, silver some 260 times, brass (or copper) and iron a little more and a little less than 100 times each respectively. This order of value is observed in the image in Nebuchadnezzar's dream, also apparently in Is. lx, 17, and in the tabernacle in the wilderness the first three metals come in the same order.

Gold and silver have long been known as the noble metals, because they do not oxidize, etc. Gold is the emblem of glory: thus we find the boards of the tabernacle covered with gold and the vessels within also of gold; the heathen made gods of silver and gold (Is. ii, 20, Ps. cxv, 4), and a crown of pure gold is set on the King's head (Ps. xxi, 3).

Silver has pre-eminently been used for money (the French word *argent* being synonymous with money): Joseph was sold for 20 pieces of silver, the Lord Jesus for 30 pieces of silver. Each Hebrew was redeemed with half a silver shekel (Ex. xxx, 13-15); thus silver stands typically for redemption or atonement, and we find that much of the silver of the atonement money was used for the sockets on which the gold-covered boards of the tabernacle rested



(Ex. xxxviii, 25-27), thus indicating that Jehovah's glory, revealed to man, is founded in atonement.

Brass (or copper) and iron indicate judgment, hard affliction, severity and strength; thus the serpent made by Moses and raised up on a pole was of brass: and the brazen sockets of the outer court of the tabernacle, Ex. xxvi, 37, xxvii, 10, speak of judgment. "Your heaven as iron and your earth as brass" (Lev. xxvi, 19), denotes severe afflictions; breaking and ruling "with a rod of iron," (Ps. ii, 9, Rev. ii, 27) indicates severity; "bones like bars of iron" (Job xl, 18), and "gates of brass and . . . bars of iron" (Ps. cvii, 16) denote strength.

#### STATEMENT BY THE AUTHOR, JULY 14TH, 1905.

Dr. Pumpell, in excavating the abundant ruins of Anan, near Askabad in Turkestan, found beads of lapis lazuli, carnelian and turquoise. This dates back to the remotest antiquity, but I do not know of sapphires in any remains of Assyrian, Egyptian, Greek or Roman cities. Askabad is not far from the Caspian Sea. It is not far from Central Asia, where I believe many once great cities lie buried under blown sands of what was, in the earliest ages, the great inland sea of Central Asia. Surely, as at Nineveh and Babylon we shall shortly learn an immense deal about their building materials, as well as their economic mineralogy. Possibly these cities may be even partly antediluvian.

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 1890 †Bigelow, Professor Melville M. Ph.D.  
 1874 Billing, Rev. F. A. M.A. LL.D. F.R.S.L.  
 1888 Bird, Arthur, Esq. F.R.G.S.  
 1904 †Birkett, Rev. Arthur Ismay, M.A.  
 1905 Blakeslee, Rev. E. M.A. Boston.  
 1884 Blair, Rev. W. Hugh T. L.T.H.  
 1873 †Bodkin, W. Esq. M.D.

- 1900 Bolton, H. Hargreaves, Esq. J.P.  
 1890 Bomford, Rev. L. G. M.A.  
 1879 Bomford, Rev. Trevor, M.A. Camb.  
 1902 Boord, Miss Eva J.  
 1887 Bourdillon, E. Esq., C.E.  
 1895 Bowman, John Hall, Esq. B.A.  
 1891 ¶ Boyd, Rev. T. Hunter.  
 1895 Breed, Rev. Professor David R. D.D.  
 1895 Breed, Rev. F. W., B.A. Durham.  
 1887 Bridgeman, Col. the Hon. Francis C.  
 1882 Broadbent, Colonel J. E. C.B. R.E.  
 1900 Brown, J. Walter, Esq.  
 1893 †Bryan, Joseph Davies, Esq.  
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     F.L.S. Acad. Sci. Nat. Ph. Cor.  
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 1883 Burr, Rev. E. F. D.D. LL.D.  
 1884 Burton, E. Esq.  
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 1892 †Butt, Rev. Canon G. H. B.A.  
 1889 †Cain, Rev. John.  
 1882 CALEDONIA, Right Rev. W. Ridley, D.D. Lord  
     Bishop of.  
 1890 Carey, Colonel William, C.B. R.A.  
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     Dean.  
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     F.R.G.S.  
 1893 Clarke, Rev. C. W. A. M.A. Camb. Prin. Noble Coll.  
     S. India.  
 1896 Clements, Rev. G. W., M.A. Oxon.  
 1888 Clyde, Rev. J. C. A.B. A.M. D.D.  
 1891 †Cobern, Rev. Camden M. B.A. S.T.B. Ph.D.  
 1893 Cockin, Rev. J.  
 1888 Cole, Aj.-General R.A.  
 1897 Collie, Frank L. Esq. M.D. C.M.  
 1898 Collins, Rev. J. M.A. Camb.  
 1900 Conference Library, Allahabad (Rev. W. E. S. Hol-  
     land, *Librarian*).  
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 1905 Corrie, Josiah Owen, Esq. B.A. F.R.A.S., *Barr.*

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- 1885 Crawford, Rev. Prof. W. A.
- 1887 \*Creak, Captain Ettrick W., C.B., R.N. F.R.S.
- 1877 Crewdson, Rev. Canon G. M.A. Camb.
- 1899 Cribb, John G. Esq.
- 1878 Crofton, Lieut.-Gen. J. R.E.
- 1890 Crosbie, Rev. Howard A. M.A.
- 1890 Cruddas, W. D. Esq. D.L. J.P.
- 1892 Cuming, George W. Esq.
- 1886 DAKOTA, Right Rev. W. H. Hare, D.D. Bishop of.
- 1894 Darley-Hartley, W. Esq. M.R.C.S. L.R.C.P.
- 1892 Darling, General Charles W. Oneida Hist. Soc.
- 1895 Darling, Rev. John Lindsey, M.A. T.C.D.
- 1884 Daunt, Rev. Canon W. M.A.
- 1894 Davies, Rev. Prof. W. W. M.A. B.D. Ph.D. Ed. Arch.  
Dep. Methodist Review, Delaware.
- 1876 Dawson, Rev. W. M.A. F.R.H.S.
- 1880 Day, Rev. A. G. M.A. Oxon.
- 1875 †De Brisay, Rev. H. de la Cour, M.A. Oxon.
- 1888 Deedes, Ven. Archdeacon Brook, M.A.
- 1894 †Della Rocchetta, of Dolceacqua, Count Arthur, late  
Capt. in the General Staff of Italian Army.
- 1890 †De Witt, Rev. Prof. John D.D.
- 1869 Dibdin, Charles, Esq. F.R.G.S. Sec. Rl. Nat. Lifeboat  
Inst. Hon. Memb. Cor. Société des Institutions de  
Prévoyance.
- 1869 Dibdin, R. W. Esq. F.R.G.S.
- 1898 Dickins, Rev. Alan, B.A.
- 1874 Dimond-Churchward, Rev. Prebendary M. D. M.A.
- 1894 Dix, Rev. Morgan, S.T.D. D.D. D.C.L.
- 1892 DOWN AND CONNOR, The Rt. Reverend T. J. Welland,  
D.D. Bishop of.
- 1897 Drake-Brockman, William Drake, Esq., late Sup.  
Engineer P.W.D. India; late A.I.C.E.
- 1888 DUNLEATH, The Rt. Hon. H. L. Lord.
- 1885 Durham, The Rt. Reverend H. C. G. Moule, D.D.  
Bishop of.
- 1880 Du-Sautoy, Mrs. F. P.
- 1889 Dykes, Rev. J. Oswald M.A. D.D.
- 1883 Ebbs, Miss Ellen Hawkins.
- 1891 Eckersley, Rev. Jas. M.A.
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Coll.
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- 1902 Emmet, Rev. William E. M.A. Oxon.
- 1880 Escott, Rev. Hay Sweet, M.A.
- 1886 Evans, Mrs. H. M.

- 1896 Evington, Right Rev. Bishop H. D.D. (Bishop in  
Kiu-shin, S. Japan).  
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 1899 †Farquharson, Mrs. M.  
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Coll. Camb.  
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 1903 Figgis, Darrell E. Esq.  
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 1903 Fisher, Rev. William, M.A.  
 1904 Fison, Walter Cornell, Esq.  
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 1881 Fleming, Sir Sandford, K.C.M.G. LL.D. F.G.S.  
F.R.G.S. V.-President Royal Soc. of Canada.  
 1900 Flint, Charles A. Esq.  
 1889 †FLORIDA, The Right Rev. E. G. Weed, D.D. S.T.D.  
Bishop of.  
 1897 Flournoy, Rev. Parke Poindexter, D.D.  
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 1882 †Fox, C. Dillworth, Esq.  
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 1904 Fraser, Rev. Charles Vincent.  
 1904 Frazer, Rev. William Henry, M.A. DD.  
 1896 Friends Foreign Mission Association, Hoshangabad,  
India.  
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 1873 †Gardner, Mrs. Ernest L.  
 1897 Garnett, Thomas, Esq.  
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 1885 Gibson, Rev. Preb. E. C. S. M.A. Oxon. D.D.  
 1877 ¶\*Girdlestone, Rev. Canon R. B. M.A.  
 1877 Goe, Right Rev. Bishop F. F. D.D.  
 1903 Goodridge, Richard E. W. Esq.  
 1876 Gould, Rev. President G. P. M.A. (Regents Park  
College).  
 1881 Gray, Charles, Esq.  
 1879 Gray, Rev. A. M.A. Oxon.  
 1891 Gray, Rev. H. J. Spence, M.A. Oxon, Chaplain to the  
Government of India.  
 1903 Gray, Brigade Surgeon Robert, M.D.  
 1893 Greg, R. Philips, Esq. J.P. F.S.A. F.G.S.  
 1877 Greenstreet, Colonel W. L. R.E.  
 1897 Greer, Mrs. Thomas.  
 1902 Gregg, Ivo Francis Hy. Carr, Esq. M.B.A.A.  
 1887 Grenfell, Rev. G. F.R.G.S.

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Oxford.
- 1901 ¶Griswold, Rev. H. D. M.A. Ph.D.
- 1897 Gutch, George A. Esq. C.E.
- 1899 Haile, A. S. Esq.
- 1892 Hall, Hugh Fergie, Esq. M.A. F.G.S.
- 1903 Hamlyn-Harris, Dr. Ronald, D.Sc. F.G.S. F.L.S.
- 1897 Hanham, Rev. Howard H.
- 1896 Hanna, His Honour Judge Septimus J. LL.D.
- 1899 Harlowe, David, Esq.
- 1901 Harmer, F. W. Esq. J.P. F.G.S.
- 1894 Harper, President Wm. Rainey, Ph.D. LL.D.  
Chicago Univ.
- 1878 Harper, The Ven. Archdeacon H. W. M.A.
- 1899 Hartley, Rev. H. A. S. M.D. Liberian Consul,  
Colombia.
- 1894 Harwood, Rev. Edwin, D.D.
- 1893 \*Heath, Captain G. P. R.N.
- 1904 Heaton, James Esq. Memb. Soc. Arts.
- 1903¶\*Hendley, Colonel Thomas Holbein, C.I.E. (Indian  
Medical Service, *retired*).
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- 1896 Hewitt, David Basil, Esq. B.A. L.R.C.S. L.R.C.P. J.P.
- 1882 Hicks, Rev. Edward, M.A. D.D. D.C.L.
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- 1892 †Hildesley, Rev. Principal A. H. M.A. Sanawar.
- 1905 Hill, Rev. James S. M.A.
- 1901 Hodges, Rev. Albert H.
- 1897 Hodgson, Rev. William, M.A. Oxon.
- 1902 †Hogarth, Rev. Oswald J. M.A.
- 1895 Honduras, Right Rev. George Albert Ormsby, D.D.  
Bishop of.
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- 1904 Hopkins, F. D. Esq. Y.M.C.A. (U.S.A.)
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- 1902 Howard, Sir Frederick, J.P.
- 1888 Howard, Joseph, Esq. B.A. Lond. M.P. F.R.G.S.
- 1903 Hull, Charles Murchison, Esq. Civil Service, Natal.
- 1900 Hull, Edward Gordon, M.A. M.D. Dub.
- 1875 Hutchinson, Mrs. C. W.
- 1889 Hutchinson, J. T. Esq. L.R.C.P.
- 1897 Hutton, Henry, Esq.
- 1890 Hyslop, Rev. James, M.A. Ph.D. F.G.S.
- 1904 Irving, Rev. Alexander, D.Sc. F.G.S.
- 1902 †Jacob, Colonel Sir S. Swinton, K.C.I.E. Jaipur.
- 1898 Janvier, Rev. Cæsar A. Rodney, M.A. (Princeton).
- 1885 Jeffers, Rev. President E. T. A.M. D.D. York Col-  
legiate Inst. U.S.A.
- 1904 Jenkins, J. Heald, Esq. M.A.
- 1898 ¶Jervis, Cavaliere W. P. F.G.S. (Turin).

- 1902 Jessop, Arthur, Esq.  
 1877 Jewell, F. G. Esq.  
 1894 Jewett, Professor J. R. Ph.D.  
 1891 Johnson, C. R. Esq. H. Sec. Brighthouse Ch. Lit. Club.  
 1896 †Johnstone, Miss J. A.  
 1903 Juhlin, Rev. G. (Sweden).  
 1879 Kaye, The Ven. W. F. J. M.A. Oxon. Archdeacon and  
     Canon of Lincoln.  
 ⚭ Kemble, Mrs. Stephen Cattley.  
 1892 Kennedy, James, Esq. B.C.S. (Ret.) M.R.A.S.  
 1898 Kerr, Robert, Esq.  
 1884 Kimball, J. E. Esq. A.M. Yale (Sup. Pub. Sc.)  
 1883 Kimm, Rev. W. F. M.A. late Fell. Cath. Coll. Camb.  
 1883 King, A. Freeman Africanus, Esq. M.D. Dean and  
     Prof. Columb. Univ. and Vermont Univ. Memb.  
     Path. Anthropol. and Biolog. Socs.  
 1887 Kirkpatrick, Rev. R. C. M.A. Oxon. and Dub.  
 1880 †Knight, Rev. C. F. M.A. Camb.  
 1884 Lach-Szyrma, Rev. W. S. M.A. Oxon.  
 1890 Lambert, Alan, Esq. F.G.S. F.R.G.S.  
 1905 Lampe, Rev. Joseph J. D.D.  
 1879 Langham, J. G. Esq.  
 1873 Lawrence, Ven. Archdeacon C. D. M.A.  
 1903 Lawrence, Samuel A. Esq.  
 1903 Lea, Alfred, Esq.  
 1873 Lea, Miss G. E.  
 1893 Lea, W. A. Esq. B.A. Sc.  
 1901 Lefroy, The Right Rev. G. A. D.D. Bishop of Lahore,  
     India.  
 1885 Lefroy, The Very Rev. W. M.A. Dean of Norwich.  
 1885 Levering, W. H. Esq. (Pres. Ind. S. S. Union).  
 1873 †Lewis, Rev. J. S. M.A.  
 1897 Linton, E. C. Esq. M.A. Camb.  
 1903 Little, Charles, Esq.  
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 1883 †Lock, Rev. W. M.A. D.D. Oxon. Fell. Jun. Bursar  
     and Tutor of Magdalen, Warden of Keble College.  
 1878 Locke, Rev. J. G. T.C.D. Senr. Fresh. 1888.  
 1892 †Logan, The Honourable James D.  
 1901 Lönnbeck, Fredrick Waldemar, Stockholm.  
 1887 Lowber, Rev. Chancellor J. W. M.A. LL.D. D.C.L.  
     Sc.D. Ph.D. P.S.D. F.R.G.S. Litt.D.  
 1888 Lowrie, Rev. S. T. M.A. D.D.  
 1877 Macpherson, Rev. A. C. M.A. A.K.C. (Hon. Loc.  
     Sec.).  
 1881 McWilliam, Rev. J.  
 1882 Maitland, Rev. H. F. M.A. Oxon.  
 1902 Mallett, Rev. Frank J. Ph.D.  
 1902 Manwaring, George A. Esq. C.E.  
 1883 MARSDEN, Right Rev. Bishop S. E. D.D.



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 1903 Martyn, Henry John, Esq.  
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     D.P.H.  
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 1888 Maxwell of Calderwood, Lady.  
 1894 Mead, Rev. Charles Marsh, Prof. Th.  
 1895 MELANESIA, Right Rev. Cecil Wilson, D.D. Bishop of.  
 1892 ¶Mello, Rev. J. Magens, M.A. F.G.S.  
 1903 Mercer, Rev. Arthur, M.A.  
 1879 Methuen, Rev. T. Plumptre, M.A.  
 1905 Millroy, Alfred Taggart Esq., Analytical Chem.  
     Memb. Soc. Chem. Ind., Memb. Amer. Chem. Soc.  
 1889 Millingen, J. R. Van, Esq.  
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 1892 †Molony, Major Francis A. R.E.  
 1898 Molony, Edmund Alexander, Esq. (Indian Civil  
     Service).  
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 1885 Moore, G. A. Esq.  
 1894 Moorehead, Prof. Warren K. M.A. F.A.A.A.S. Curator,  
     Dep. of Arch., Phillips Acad. Andover, U.S.A.  
 1879 Morley, Right Rev. S. Bishop of Tinnevely.  
 1882 Moule, Ven. Archdeacon A. E. B.D. (Mid China).  
 1892 Moulson, Rev. J. M.A. New Coll. Oxon. Sen. Chap  
     Bengal.  
 1878 †Mullings, John, Esq.  
 1893 Munt, George William, Esq.  
 1871 †Nelson, J. H. Esq. M.A.  
 1885 †Neve, A. Esq. F.R.C.S. L.R.C.P. Edin.  
 1888 †Nimr, Faris, Esq. (Ed. "Mouktataf").  
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 1887 Norbury, Inspector-Gen. Sir H. F. K.C.B. M.D.  
     F.R.C.S. R.N.  
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 1886 Oates, Rev. A.  
 1880 O'Dell, Professor Stackpool E.  
 1902 ¶Odling, Charles W. Esq. C.S.I.  
 1872 Ogle, W. Esq. M.D.  
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 1899 Orr, Major Walter Hood, I.M.S.  
 1891 Oulton, Rev. Richard Charles, M.A. B.D.  
 1902 Paine, Robert Treat, Esq.  
 1898 Parker, Rev. Alvin Pierson, D.D. President, Anglo-  
     Chinese College, Shanghai.

- 1883 Paterson, Rev. T. M. B.  
 1903 Payne, George Herbert, Esq.  
 1885 †Payne, J. A. Otonba, Esq. F.R.G.S. Chief Registrar  
 and Taxing Master of the Supreme Court of Lagos.  
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 Mansfield Coll. Oxon.  
 1887 †Penford, Rev. E. J.  
 1902 Penn, Rev. William Charles, M.A.  
 1903 Petch, Rev. Charles Cousens.  
 1894 Pike, Rev. Sidney, M.A. Camb.  
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 1884 Piper, F. H. Esq.  
 1881 Pippet, Rev. W. A.  
 1896 Plantz, Rev. President Samuel, D.D. Ph.D.  
 1890 Porte, Rev. J. R. A.M. D.D.  
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 1898 Potter, Ven. Archdeacon Beresford, M.A. T.C.D.  
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 1880 †Priestley, Rev. J. J. S.P.G.  
 1888 †Pringle, of Torwoodlee, Mrs.  
 1903 Proctor, Henry, Esq. H.M.C.S. M.R.A.S.  
 1875 Rate, Rev. J. M.A. Camb.  
 1891 Reddie, Edward J. Esq.  
 1894 Reed, F. R. Cowper, Esq. B.A. F.G.S. Asst. to  
 Woodwardian Prof. of Geology Camb.  
 1876 Rendell, Rev. Canon A. M. M.A. Camb.  
 1899 Revie, Rev. Dugald, M.B. C.M. Glas. Univ. Free  
 Church of Scot. Medical Mission.  
 1877 Rhodes, Rev. D.  
 1878 Rhodes, Colonel G. J.P.  
 1903 Rice, Hon. and Rev. W. Talbot, M.A. Oxon.  
 ♣\*Rigg, Rev. J. H. D.D. Principal of the Wesleyan Training  
 College, Ex-President of the Wesleyan Conference.  
 1885 Riggs, Rev. J. F. B.A. M.A.  
 1899 Rimington, Alexander Wallace, Esq.  
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 1895 Robinson, Maj.-General C. G. R.A.  
 1894 Rogerson, Rev. Geo. M.A.  
 1884 †Ross, Rev. G. H. W. Lockhart, B.A.  
 1891 Rouse, Rev. G. H. LL.B.  
 1881 ROYSTON, The Right Rev. Bishop P. S. D.D.  
 1903 Ryan, Hugh S. K. Esq. M.A.  
 1897 Saint-Amant, George Stanley, Esq. B.Sc. Paris.  
 1883 St. Andrew's University, Court of; Stuart Grace, Esq.  
 Factor.  
 1891 St. Johns, New Brunswick Free Pub. Lib. J. R. Reul,  
 Esq. Chairman.  
 1881 Sandford, H. Esq.  
 1895 SASKATCHEWAN, Right Rev. J. Newnham, D.D.  
 Bishop of.

- 1891 ¶Schofield, Alfred Taylor, Esq. M.D.  
 1895 Seddon, Rev. W. H. M.A. Oxon.  
 1876 †Seeley, Rev. E.  
 1880 †SELKIRK, The Right Rev. W. C. Bompas, D.D. Lord  
     Bishop of.  
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     Superintendent, Bible Soc.  
 1899 Sharpe, Cecil, Esq.  
 1902 Sharpe, W. E. Thompson, Esq. M.A. M.P.  
 1882 Shepherd, Mrs. F. Wolfskill De.  
 1901 †Sherard, Rev. Clement E. M.A. Camb.  
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 1882 Shore, Captain the Hon. H. N. R.N.  
 1876 ¶\*†Sinclair, The Ven. Archdeacon W. Macdonald, M.A.  
     D.D. form. Sch. of Balliol, Oxon.  
 1892 SINGAPORE, LABUAN AND SARAWAK, Rt. Rev. George  
     Fredk. Hose, D.D. Lord Bishop of; V.P.  
     R.A.Soc. Straits Branch.  
 1880 Skinner, J. A. Esq.  
 1892 Smith, Hon. Sir Charles Abercrombie, M.A. Fell.  
     St. Peter's Coll. Camb.  
 1901 †Smith-Bosanquet, Miss Ella.  
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 1896 Smith, Colonel George Hugh.  
 1893 Smith, Sir George J. J.P. D.L.  
 1897 Smith, Herbert J. Esq.  
 1896 Smith, Rev. John, D.D.  
 1891 Smith, S. Ashley, Esq. M.D.  
 1902 Smyth, William Woods, Esq. L.R.C.S. L.R.C.P.  
 1903 Spencer, Professor J. W. Ph.D. F.G.S.  
 1879 ¶Statham, E. J. Esq. C.E. A.I.C.E.  
 1879 †Stewart, Alex. Esq.  
 1872 Stewart, Sir Mark J. McTaggart, Bart. M.A. M.P.  
 1891 Stirling, Lt.-General Sir W. K.C.B. R.A.  
 1890 †Stokes, Anson Phelps, Esq. Vice-Pres. XIX Cent.  
     Club U.S.A. Memb. Council, S.S. Assoc.  
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 1887 Stokes, Rev. W. Fenwick, M.A.  
 1903 Stovin, Mrs. Caroline.  
 1902 †Strong, John Alexander, Esq.  
 1902 †Strong, Rev. Rupert S. B.A. Camb.  
 1903 Sundholm, S. Esq. B.A. (Finland).  
 1888 Sutton, M. J. Esq. J.P. F.L.S. F.R.G.S. Chev. Leg. of  
     Honour.  
 1895 Swinburne, Hon. George, C.E.  
 1903 Switzer, Rev. B. Neptune, M.A.  
 1899 Symonds, Hon. J. W.  
 1899 †Talmage, Professor James E. Ph.D. F.R.M.S. F.G.S.  
     F.R.S.E. F.G.S.A.  
 1873 Tanson, Rev. R. K.C.L.

- 1882 Taylor, Rev. Hugh Walker, M.A.  
 1891 †Taylor, Rev. Stephen, B.A. Corpus C. Coll. Camb.  
 1887 Taylor, The Venerable Archdeacon W. F. D.D.  
 1893 Teape, Rev. W. Marshall, A.B. M.A. Edin. and Camb.  
     Vicar of South Hylton, Sunderland.  
 1884 Temple, Lt.-Colonel Sir R. C. Bart. C.I.E. Beng.  
     Staff Corps F.R.G.S. M.R.A.S. Memb. Philog.  
     and Folk-lore Soc. Anthropol. Inst. and Asiatic  
     Soc. Beng.  
 1899 Thompson, Rev. Fayette L.  
 ⚡ Thornton, the Right Rev. Samuel, D.D. late Bishop  
     of Ballarat.  
 1903 Tilby, James Martin, Esq.  
 1894 Tinsley, Rev. Peter D.D.  
 1873 Tomkins, Rev. W. Smith.  
 1894 Tomlinson, Mrs. E. M.  
 1902 Trumbull, C. G. Esq. Philadelphia.  
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 1882 TUTTLE, Right Rev. D. S. D.D. Bishop of Missouri.  
 1902 Twigg, John Hill, Esq. late India Civil Service.  
 1898 Tydeman, E. Esq. F.R.G.S. Lawrence Military Asylum.  
 1903 Urlin, Richard Denny, Esq. B.L. F.S.S. Barr. at Law.  
 1889 Urquhart, Rev. J.  
 1876 WALAPU, Right Rev. William Leonard Williams, B.A.  
     Bishop of.  
 1893 Waller, Rev. C. Cameron, M.A. Camb. Principal of  
     Huron Coll.  
 1900 Waller, Rev. E. H. M.; M.A. late Scho. C.C.C. Camb.  
 1892 Walter, Rev. H. M. M.A. Oriel Oxon.  
 1894 Ward, H. B. Esq.  
 1904 Wardle, Sir Thomas, J.P. F.G.S.  
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OBJECTS, CONSTITUTION, AND BYE-LAWS

OF

The Victoria Institute,

OR

Philosophical Society of Great Britain.

Adopted at the First Annual General Meeting of the Members and Associates  
May 27th, 1867, with Revisions of 1874-75.

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Seventh. To found a Library and Reading Rooms for the use of the Members and Associates of the Institute, combining the principal advantages of a Literary Club.

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2. The government of the Society shall be vested in a Council, to which Members only shall be eligible,\* consisting of a President, two or

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\* *Exception.* If an Associate has been selected, it has been at an Annual General Meeting, and then only after the whole of the Members had been consulted, and no disapproval signified.



more (not exceeding seven) Vice-Presidents, a Treasurer, one or more Honorary Secretaries, and twelve or more (not exceeding twenty-four) Ordinary Members of Council, who shall be elected at the Annual General Meeting of the Members and Associates of the Institute. But, in the interval between two Annual Meetings, vacancies in the Council may be filled up by the Council from among the Members of the Society ; and the Members chosen as Trustees of the funds of the Institute shall be *ex officio* Members of Council.

3. Any person desirous of becoming a Member or Associate shall make application for admission by subscribing the Form A of the Appendix, which must be signed by two Members of the Institute, or by a Member of Council, recommending the candidate for admission as a Member ; or by any one Member of the Institute, for admission as an Associate.

4. Upon such application being transmitted to one of the Secretaries, the candidate for admission may be elected by the Council, and enrolled as a Member or Associate of the Victoria Institute, in such manner as the Council may deem proper ; having recourse to a ballot, if thought necessary, as regards the election of Members ; in which case no person shall be considered as elected unless he have three-fourths of the votes in his favour.

5. Application for admission to join the Institute being thus made by subscribing Form A, as before prescribed, such application shall be considered as *ipso facto* pledging all who are thereupon admitted as Members or Associates to observe the Rules and Bye-Laws of the Society, and as indicative of their desire and intention to further its objects and interests ; and it is also to be understood that only such as are professedly Christians are entitled to become *Members*.

6. Each Member shall pay an Entrance Fee of One Guinea and an Annual Contribution of Two Guineas. A Donation of Twenty Guineas shall constitute the donor a Life Member.

7. Each Associate shall pay an Annual Contribution of One Guinea. A donation of Ten Guineas shall constitute the donor a Life Associate.

8. The Annual Contributions shall be considered as due in advance on the 1st day of January in each year, and shall be paid within three months after that date ; or, in the case of new admissions within three months after election.

9. Any Member or Associate who contributes a donation in one sum of not less than Sixty Guineas to the funds of the Institute shall be enrolled as a Vice-Patron thereof, and will thus also become a Life Member or Life Associate, as the case may be.

10. Should any member of the Royal Family hereafter become the Patron, or a Vice-Patron, or Member of the Institute, the connexion shall be regarded as purely Honorary ; and none of the Rules and Bye-Laws relating to donations, annual contributions or obligations to serve in any office of the Society, shall be considered as applicable to such personages of Royal Blood.

11. Any Member or Associate may withdraw from the Society at any time, by signifying a desire to do so by letter, addressed to one of the Secretaries ; but such shall be liable for the contribution of the current year, and shall continue liable for the annual contribution, until all sums due to the Society from such Member or Associate shall have been paid, and all books or other property borrowed from the Society shall have been returned or replaced.

12. Should there appear cause, in the opinion of the Council, for the exclusion from the Society of any Member or Associate, a private intimation may be made by direction of the Council, in order to give such Member or Associate an opportunity of withdrawing from the Society ; but, if deemed necessary by the Council, a Special General Meeting of Members shall be called for the purpose of considering the propriety of expelling any such person : whereat, if eleven or more Members shall ballot, and a majority of those balloting shall vote that such person be expelled, he shall be expelled accordingly. One month's notice, at least, shall be given to the Members of any such Special General Meeting.

13. Non-resident Members and Associates, or others desirous of promoting the objects and interests of the Institute, may be elected by the Council to act as corresponding Members abroad, or as Honorary Local Secretaries, if within the United Kingdom, under such arrangements as the Council may deem advisable.

14. The whole property and effects of the Society shall be vested in two or more Trustees, who shall be chosen at a General Meeting of the Society. The Trustees are empowered to invest such sums as the Council may, from time to time, place in their hands, in, or upon any of the Stocks, Funds, or Securities, for the time being, authorized by statute for the

investment of trust funds by trustees, and shall have the usual powers of trustees in regard thereto. [The President, Hon. Treasurer, and Hon. Secretary may officially give effect to such resolutions as a General Meeting may pass in regard thereto.]

14a. All moneys received on account of the Institute shall be duly paid to its credit at the Bankers, and all cheques shall be drawn, under authority of the Council, and shall be signed by the Honorary Treasurer and Honorary Secretary.

15. The accounts shall be audited annually, by a Committee, consisting of two Members,—one of whom may be on the Council,—to be elected at an Ordinary Meeting of the Society preceding the Anniversary Meeting. This Committee shall make a written Report to the Council at the first Meeting after such audit, and also to the Institute, upon the day of the Annual General Meeting,—stating the balance in the Treasurer's hands and the general state of the funds of the Institute.

16. Both Members and Associates shall have the right to be present to state their opinion, and to vote by show of hands at all General and Ordinary Meetings of the Society; but Members only shall be entitled to vote by ballot, when a ballot is taken in order to determine any question at a General Meeting.

### § III. *Bye-Laws* (Privileges).

1. A Member or Associate, when elected, shall be so informed by the Secretary in a printed copy of the letters, Form B, in the Appendix.

2. Members and Associates shall not be entitled to any privileges, or have the right to be present, or to vote at any of the Meetings of the Society, till they have paid the contributions due by them.

3. Annual subscriptions shall be considered as in arrear, if not paid on or before 31st March in each year, or within three months after election, as the case may be.

4. Should any annual subscription remain in arrear to the 30th June, or for six months after election, the Treasurer shall cause to be forwarded to the Member or Associate from whom the subscription is due, a letter, Form D, in the Appendix, unless such Member or Associate reside out of the United Kingdom; in which case the Form D shall not be sent unless the subscription continues unpaid till the 30th September.

5. If any arrears be not paid within twelve months, the Council shall use their discretion in erasing the name of the defaulter from the list of Members or Associates.

6. Members shall be entitled to introduce two Visitors at the Ordinary Meetings of the Society; and to have sent to them a copy of all the Papers read before the Society, which may be printed in its Transactions or otherwise, and of all other official documents which the Council may cause to be printed for the Society; they will also be entitled to a copy of all such translations of foreign works or other books as are published under the auspices of the Society in furtherance of Object 6 (§ I.).

7. Associates may introduce two Visitors at the Ordinary Meetings, and shall be entitled to all the minor publications of the Society, and to a copy of its Transactions during the period of their being Associates, but not to the translations of foreign works or other books above referred to.\* It shall, however, be competent to the Council of the Society, when its funds will admit of it, to issue the other publications of the Society to Associates, being ministers of religion, either gratuitously or at as small a charge as the Council may deem proper.

8. When it shall be found necessary to send the letter, Form D, to any Member or Associate who may be in arrear, the printed papers and other publications of the Society shall cease to be sent to such Member or Associate till the arrears are paid; and, until then, he shall not be allowed to attend any Meeting of the Society, nor have access to any public rooms which may be in its occupation.

9. The Library† shall be under the management and direction of the Council, who are empowered to designate such works as shall not be allowed to circulate.

10. Each Member‡ shall be allowed to borrow books from the Library, and to have not more than three volumes in his possession at the same time; pamphlets and periodical publications not to be kept above fourteen days, nor any other book above three weeks.

11. Members who may borrow books from the Library shall be answerable for the full value of any work that is lost or injured.

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\* These, as well as the Transactions issued in the years previous to their joining, may be purchased at half price.

† For the use of Members and Associates.—*See 7th Object.*

‡ Members only are allowed to take books away.

12. Periodical publications shall remain on the table for a month other books for a fortnight, after they are received.

13. When a book or pamphlet is wanted, and has been the stipulated time in the possession of any Member, the Secretary shall request its return, and a fine of threepence a day shall be incurred for every day it may be detained, which fine shall commence on the third day after the transmission of the notice in the case of town Members, and after the sixth day in the case of country Members ; and until the return of such works, and the discharge of all fines incurred, no further issue of books shall be permitted to the Member applied to.

14. The books shall be ordered in for inspection at such times as the Council shall appoint, and a fine of half-a-crown shall be incurred for neglecting to send in books by the time required in the notice.

15. A book shall lie on the Library table in which Members may insert, for the consideration of the Council, the titles of such works as they desire to be purchased for the Institute.

#### § IV. *Bye-Laws* (General, Ordinary, and Intermediate Meeting).

1. A General Meeting of Members and Associates shall be held annually on May 24th (being Her late Majesty's birthday, and the Society's anniversary), or on the Monday following, or on such other day as the Council may determine as most convenient, to receive the Report of the Council on the state of the Society, and to deliberate thereon ; and to discuss and determine such matters as may be brought forward relative to the affairs of the Society ; also, to elect the Council and Officers for the ensuing year.

2. The Council shall call a Special General Meeting of the Members and Associates, when it seems to them necessary, or when required to do so by requisition, signed by not less than ten Members and Associates, specifying the question intended to be submitted to such Meeting. Two weeks' notice must be given of any such Special General Meeting ; and only the subjects of which notice has been given shall be discussed thereat.

3. The Ordinary Meetings of the Society shall usually be held on the first and the Intermediate Meetings on the third Monday evenings in each month, from November to June inclusive, or on such other evenings

as the Council may determine to be convenient : and a printed card of the Meetings for each Session shall be forwarded to each Member and Associate.

4. At the Ordinary and Intermediate Meetings the order of proceeding shall be as follows : The President, or one of the Vice-Presidents, or a Member of the Council, shall take the chair at 4.30 o'clock precisely, the minutes of the last Ordinary or Intermediate Meeting shall be read aloud by one of the Secretaries, and, if found correct, shall be signed by the Chairman ; the names of new Members and Associates shall be read ; the presents made to the Society since their last Meeting shall be announced ; and any other communications which the Council think desirable shall be made to the Meeting. After which, the Paper or Papers intended for the evening's discussion shall be announced and read, and the persons present shall be invited by the Chairman to make any observations thereon which they may wish to offer.

The claims of Members and Associates to take part in a discussion are prior to those of Visitors. The latter when desiring to speak upon any Paper, must first send their cards to the Chairman and ask permission (unless they have been specially invited by the Council "to attend, and join in considering the subject before the Meeting," or are called upon by the Chairman). 1875.

5. The Papers read before the Society, and the discussions thereon, fully reported, shall be printed by order of the Council ; or, if not, the Council shall, if they see fit, state the grounds upon which this Rule has been departed from, in the printed Journal or Transactions of the Society.

6. The Council may at their discretion authorize Papers of a general kind to be read at any of the Ordinary or Intermediate Meetings, either as introductory lectures upon subjects proper to be afterwards discussed or as the results of discussions which have taken place, in furtherance of the 5th Object of the Society (§ I.).

7. With respect to Intermediate Meetings, the Papers read at which are not necessarily printed nor the discussions reported,\* the Council at its discretion, may request any lecturer or author of a Paper to be read thereat, previously to submit an outline of the proposed method of treating his subject.

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\* So arranged when the "Intermediate Meetings" were commenced 16th January, 1871.

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The first part of the paper discusses the importance of the research and the objectives of the study. It then proceeds to a literature review, followed by a description of the methodology used. The results of the study are presented in the next section, followed by a discussion of the findings and their implications. The paper concludes with a summary of the main points and suggestions for further research.

The research was conducted in a systematic and rigorous manner, following the principles of good research practice. The data collected was analyzed using appropriate statistical methods, and the results were presented in a clear and concise manner. The findings of the study are discussed in detail, and their implications are explored. The paper concludes with a summary of the main points and suggestions for further research.

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